SYMMETRIC VERSUS ASYMMETRIC VOWEL HEIGHT HARMONY AND e, o VERSUS ɪ, ʊ IN PROTO-BANTU AND PROTO-SAVANNA BANTU

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Hyman (1999) challenges the hypothesis that a certain peculiarity of Bantu vowel height harmony, namely an asymmetry in how it operates in front versus back vowels, goes back to Proto-Bantu. He finds that this asymmetry is absent in the northwest, where all the non-Savanna branches are concentrated, and suggests that it might be a Savanna innovation. I show that this would force us to say that the non-ATR high vowels ɪ, ʊ were also a Savanna innovation, and to reconstruct Proto-Bantu with the ATR mid vowels e, o instead of these. The cost of this would be prohibitive. Moreover, if we keep Proto-Bantu ɪ, ʊ, we can explain the loss of the asymmetry as a natural consequence of the loss of these vowels: (i) Proto-Bantu ɪ, ʊ become e, o, (ii) the harmony thereby becomes ATR-based, and (iii) the asymmetry, which is unexpected in ATR harmony, is eliminated.

Hyman (1999) met en doute l'hypothèse qu'une certaine particularité de l'harmonie d'ouverture vocalique du bantou, à savoir une asymétrie dans sa manière d'opération dans les voyelles antérieures contre postérieures, remonte au proto-bantou. Il trouve que cette asymétrie est absente dans le nordouest, où toutes les branches non-Savane sont concentrées, et suggère qu'elle pourrait être une innovation Savane. Je montre que ceci nous obligerait à dire que les voyelles non-ATR hautes ɪ, ʊ elles aussi étaient une innovation Savane, et à reconstruire le proto-bantou avec les voyelles ATR moyennes e, o à la place de celles-là. Le prix de ceci serait prohibitif. De plus, si nous retenons proto-bantou ɪ, ʊ, nous avons une explication historique simple de la perte de l'asymétrie: (i) proto-bantou ɪ, ʊ deviennent e, o, (ii) l'harmonie se rebase de ce fait sur ATR, et (iii) l'asymétrie, qui est inattendue dans l'harmonie ATR, est éliminée.

0. INTRODUCTION

Hyman, in a recent major article on "The historical interpretation of vowel harmony in Bantu" (1999), challenges the general assumption that a certain peculiarity of Bantu vowel height harmony (VHH), namely an asymmetry in how it operates in front versus back vowels in verbal extensions, goes back to Proto-Bantu.[1] He finds that this asymmetry is in fact absent in the northwestern part of the Bantu area, where all the non-Savanna branches of Bantu are concentrated, and suggests that it might be a Savanna Bantu innovation, and a useful criterion for membership of the Savanna branch (1999:236, 255–256).

The Savanna branch, or at least something very like the Savanna branch, was first identified in two independent articles which appeared only in 1973, two years after the final volume of Guthrie's *Comparative Bantu*; one of them was by Henrici, who called it the Central branch, and the other by Heine, who called it the Congo branch. The Savanna branch on its own occupies virtually the whole of the Bantu area outside Guthrie's Zones A, B, and C, or twelve zones altogether out of Guthrie's total of fifteen. Obviously, as Guthrie and his predecessors had not known about this Savanna branch, it is appropriate to ask whether the traditional reconstructions of Proto-Bantu might not be more valid as reconstructions of Proto-Savanna Bantu than they are of Proto-Bantu proper, and to investigate possible differences between Proto-Bantu and Proto-Savanna Bantu with a view to establishing Savanna Bantu innovations. Hyman's work is of special interest in this particular context.

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Serious doubts arise, however, about the particular Savanna Bantu innovation that he is proposing. As a general rule the vowel harmony of the non-Savanna Bantu languages is not only symmetrical but ATR-based, while the vowel harmony of the Savanna Bantu languages is not only asymmetrical but also non-ATR-based. Hyman's hypothesis that the asymmetry is a Savanna Bantu innovation would thus appear to require us to say that the rebasing of the ATR-based vowel harmony on something else was also a Savanna Bantu innovation, and to reconstruct the vowel harmony of Proto-Bantu as both symmetrical and ATR-based. This would mean reconstructing Proto-Bantu not with the non-ATR high vowels ɪ, ʊ, for which there is a very strong case (Stewart 1970, 1983, 2000; Schadeberg 1994/95), but with the ATR mid vowels e, o.

I shall begin by restating the case for reconstructing Proto-Bantu with the non-ATR high vowels ɪ, ʊ. Then, after reviewing the evidence for the geographical distribution of the present-day seven-vowel languages with the non-ATR high vowels ɪ, ʊ and of those with the ATR mid vowels e, o, I shall consider the implications for the symmetric versus asymmetric issue in both Proto-Bantu and Proto-Savanna Bantu.

1. THE CASE FOR RECONSTRUCTING PROTO-BANTU WITH THE NON-ATR HIGH VOWELS ɪ, ʊ

The great majority of Bantu languages have one or another of the three vowel systems on the left in (1), and to each of these corresponds a different vowel height harmony rule affecting those verbal extensions which are reconstructed with a second degree vowel in their base form in Proto-Bantu; if we disregard for the moment the special rules that apply where there is front versus back asymmetry, the VHH rules are as indicated on the right in (1).

(1)	a.	i	e	ɛ	a	ɔ	o	u	e, o	→	ɛ, ɔ after stem	ɛ, ɔ (symmetric)
	b.	i	ɪ	ɛ	a	ɔ	ʊ	u	ɪ, ʊ	→	ɛ, ɔ after stem	ɛ, ɔ (asymmetric)
	c.	i		ɛ	a	ɔ		u	i, u	→	ɛ, ɔ after stem	ɛ, ɔ (asymmetric)

Where there is front versus back asymmetry, a back vowel in the extension is replaced with ɔ only after ɔ, not after ɛ; for instance, in Nyamwezi F.22 as described by Maganga and Schadeberg (1992), a language with system (1b) cited by Hyman (1999:237), the applicative extension **ɪl** has a variant **ɛl** after both ɛ and ɔ as we see in the left-hand column in (2), while the reversive transitive extension **ʊl** has a variant **ɔl** after ɔ and only after ɔ as as we see in the right hand column (note that I have retranscribed Maganga and Schadeberg's e, o as ɛ, ɔ).

(2)	a.	-βɔn-él-a	see + appl	-hɔng-ól-a	break off
	b.	-zɛɛng-ɛl-a	build + appl	-zɛɛng-ʊl-a	build
	c.	-βis-ɪl-a	hide + appl	-βis-úl-a	find out
		-pʊnd-ɪl-a	bend + appl	-pʊnd-ʊl-a	overturn
		-gub-ɪl-a	put on lid + appl	-gub-úl-a	take off lid
		-shʊʊn-ɪl-a	gnaw + appl	-shʊʊn-ʊl-a	show teeth
		-gaβ-ɪl-a	divide + appl	-gaβ-ʊl-a	divide

Guthrie posits the seven-vowel system in (1a) in Proto-Bantu (1967-71 vol.1:61); in this system the second degree vowels are e, o, which are ATR mid by my analysis. He derives the seven-vowel system in (1b) from that in (1a) by a sound change which

replaces these vowels with their non-ATR high counterparts ɪ, ʊ. He then derives the five-vowel system in (1c) from the seven-vowel system in (1b) by a sound change which merges the non-ATR high vowels ɪ, ʊ with their plain high counterparts i, u. This latter change is commonly known as the "7 > 5" vowel shift.

I differ from Guthrie in that I posit the seven-vowel system in (1b) in Proto-Bantu, and derive the seven-vowel system in (1a) from that in (1b) by a sound change which replaces the non-ATR high vowels ɪ, ʊ with their ATR mid counterparts e, o (Stewart 1970, 1983, 2000). However, I also differ crucially from Guthrie in another way: I reconstruct Proto-Bantu not in isolation but in the context of the reconstruction of Proto-Potou-Tano-Bantu (P-PTB), the earliest of the protolanguages ancestral to Proto-Bantu for which we have a substantial body of true reconstructions arrived at by the comparative method. The Potou-Tano languages are spoken in Ghana and Côte d'Ivoire. They display a much more impressive array of regular sound correspondences with the Bantu languages than they do with the languages immediately to the east, namely Ga, Dangme, and Ewe, despite the fact that all provisional lexicostatistical and similar classifications to date have led us to expect the contrary. It is important to note that PTB cuts across Bennett and Sterk's Western and Eastern divisions of their South Central Niger-Congo, also known as New Kwa and New Benue-Congo, respectively, which have never been confirmed by reconstruction of the putative protolanguages, and represents a challenge to the validity of these groupings as true genetic entities. My own working hypothesis is that Potou-Tano is a Bantoid enclave (Stewart 2001).

I posit all seven of the vowels of the system in (1b) not only in Proto-Bantu but also in Proto-PTB and in Proto-Potou-Tano, and consider all seven to have been inherited unchanged not only in Bantu languages with system (1b) but also in most of the Tano languages, including Akan.

In reconstructing the seven-vowel system in (1b) in Proto-Bantu and Proto-PTB, I have taken account of certain synchronic and diachronic assumptions I make about ATR (Stewart 1970, 1971). These assumptions about ATR are modelled on Ferguson's about nasality in his article "Assumptions about nasals: A sample study in phonological universals" (1963), and on Greenberg's further assumptions about nasality in his article "Synchronic and diachronic universals in phonology" (1966). On the model of Greenberg's implicational universal that "the presence of nasal vowels in a language implies the presence of oral vowels but not vice versa," I assume first, that the presence of non-ATR high vowels in a language implies the presence of ATR high vowels but not vice versa, and second, that the presence of ATR low vowels in a language implies the presence of non-ATR low vowels but not vice versa. Non-ATR high vowels and ATR low vowels thus resemble nasalized vowels in that they occupy the position of implicans in implicational universals, and just as we can make diachronic generalizations about the creation and loss of nasalized vowels, so we might expect to be able to make diachronic generalizations about the creation and loss of non-ATR high vowels and about the creation and loss of ATR low vowels.

In the present context, our concern is with those diachronic generalizations that we are able to make about the loss of non-ATR high vowels. Both of the following were found at an early stage to be clearly attested in the languages of the Tano (i.e., Akanoid) group (Stewart 1970, 1971, 1983): (i) change from non-ATR high to ATR non-high, i.e., from ɪ, ʊ to e, o, and (ii) change from non-ATR high to ATR high, i.e., from ɪ, ʊ to i, u. The first of these is the more common in the Tano languages.

Now, let us look at the three Bantu vowel systems in (1) in the light of this. Obviously, the five-vowel system in (1c) is the result of a post-Bantu innovation, and that leaves only two which could possibly go back to Proto-Bantu: the two seven-vowel systems in (1a) and (1b). Now, the post-Bantu innovation which would be required to convert (1b) into (1a) is the same as the first and better attested of the two attested changes which lose the non-ATR high vowels ɪ, ʊ in the Tano languages, namely the one which converts them into the ATR non-high vowels e, o. The reconstruction of (1b) in Proto-Bantu thus scores very high on the phonetic plausibility of the soundshift it implies. The reconstruction of (1a), on the other hand, would imply a post-Bantu innovation whereby non-ATR high vowels were not lost but created; the vowel shift which would create them is not to my knowledge clearly attested in any language anywhere, and the reconstruction of (1a) in Proto-Bantu thus scores very low on the phonetic plausibility of the soundshifts it implies. So, on the evidence of the phonetic plausibility of the soundshifts implied there is just no contest: (1b) wins easily.

Note, moreover, that the post-Bantu innovation which is generally assumed to convert (1b) into the five-vowel system in (1c), namely the 7>5 vowel shift, is the same as the second of the two attested changes which lose the non-ATR high vowels ɪ, ʊ in the Tano languages, namely the change which merges them with their ATR counterparts i, u. Thus, all the differences which distinguish the three Bantu vowel systems in (1) are readily explained in terms of our existing assumptions about the loss of the non-ATR high vowels ɪ, ʊ.

If we look at Bantu not in isolation but in the Potou-Tano-Bantu context, we find that the respective cases for (1b) and against (1a) are both strengthened. Proto-PTB and Proto-Potou-Tano are both at present reconstructed with (1b), so that if we reconstruct (1b) in Proto-Bantu, that system is inherited unchanged from P-PTB, whereas if we reconstruct (1a) in Proto-Bantu, that system has to be innovated, so that there is an overall increase in complexity. We could in theory reconstruct (1a) in both Proto-Bantu and Proto-PTB, but then we would have to innovate (1b) at some stage of PTB-to-Tano, with the result that the highly implausible change from (1a) to (1b) was posited twice: once in Bantu-to-(1b) Bantu, and once in PTB-to-Tano.

There remains an apparent obstacle in the way of positing the change from ɪ, ʊ to e, o in the non-Savanna Bantu languages. As these languages constitute not a single branch coordinate with the Savanna branch but a number of different branches, we have to posit not just one change but a number of genetically independent identical changes. The change is, however, one that could easily have been spread by diffusion across the northwestern area. We shall, in fact, see below that in one northwestern language which has undergone the change, namely Nen (A.44), the change occurred only after its input had been bled by a change not shared with the northwestern languages in general, and must therefore be accepted as genetically independent of identical changes elsewhere in the northwest.

2. THE PRESENT-DAY GEOGRAPHICAL DISTRIBUTION OF THE VOWEL PAIRS ɪ, ʊ AND e, o

In considering Hyman's suggestion that the asymmetry in the vowel harmony might be a Savanna Bantu innovation, I have been assuming that as a general rule the symmetrical vowel harmony characteristic of the non-Savanna Bantu languages is ATR-based while the asymmetrical vowel harmony characteristic of the Savanna

Bantu languages is non-ATR-based. Hyman neither claims nor denies this, though I suspect that he would probably agree, with the entirely reasonable reservation that that we should bear in mind that in the case of the seven-vowel languages, it is not always clear from the available descriptive works whether the degree 2 vowels of a particular language are **e**, **o**, in which case any harmony will be ATR-based, or **ɪ**, **ʊ**, in which case any harmony will be non-ATR-based.

This problem with the evidence arises from the fact that up until Guthrie's time and beyond, Bantuists favoured the phoneme rather than the distinctive feature as the basic unit of phonology, and saw little reason if any to distinguish between the two different seven-vowel systems. In descriptive works, the use of a particular set of seven vowel symbols did not necessarily imply a claim that the vowels had the phonetic qualities normally associated with these symbols. Both Guthrie and Meeussen represented the Proto-Bantu vowel system as /ɨ i e a o u ʉ/ without implying a claim that the degree 2 vowels of Proto-Bantu were high and not mid. Meeussen was quite explicit about not making any such claim, stating that "another transcription of the same vowel system is /i e ɛ a ɔ o u/" (1967:82), while Guthrie did in fact assume the system to have been [i e ɛ a ɔ o u] phonetically, as we have seen, and not the [i ɪ ɛ a ɔ ʊ u] that his phonemic representation seems to suggest.

It certainly appears at first sight that languages either with system (1b), or with system (1c) which is plausibly derived from system (1b) but not from system (1a), are predominant in the Savanna area, while languages with system (1a) are concentrated mainly in the non-Savanna area in the northwest. Let us look first at the languages with the five vowels of system (1c): according to Guthrie's (1967-71 vol.1:66) map of the 7>5 vowel shift, that shift has affected a good half of the total Bantu area but has left most of the non-Savanna area in the northwest unaffected. Guthrie has no map of his controversial vowel shift **e**, **o** > **ɪ**, **ʊ**, by which he derives system (1b) from system (1a), but he does note (p. 61) that system (1b) occurs mainly in subzones D.20, 40, 50, F.20, M10, N.10, and P.10, and none of these are in the non-Savanna area in the northwest.

I draw further reassurance from findings reported by Hyman (1999:246ff.), who after reminding us of the hazards involved in relying on the sets of vowel symbols used in descriptions of individual Bantu languages, goes on to document the sets used for a sample of 47 seven-vowel systems in his Bantu vowel harmony database. He comments as follows on what he finds: "It would appear that [sets of symbols suggesting (1a) are] more frequently used to transcribe NW Bantu languages (zones A-D), while [sets of symbols suggesting (1b) are] more restricted to Eastern Bantu. However, it is hard to make reliable generalizations from this small sample...." He is nonetheless able to make the highly significant generalization that "languages that are agreed unambiguously to have the vowel system [(1a)] all have symmetric VHH" (1999:250); this suggests surely that we are unlikely to find any languages with vowel system (1a), in which the harmony is necessarily ATR-based, which display asymmetry in the harmony.

3. THE IMPLICATIONS FOR THE SYMMETRIC VERSUS ASYMMETRIC ISSUE IN PROTO-BANTU AND PROTO-SAVANNA BANTU

I look now at the implications for the symmetric versus asymmetric issue in Proto-Bantu and Proto-Savanna Bantu. An obvious consequence of my reconstructing the non-ATR high vowels **ɪ**, **ʊ** in Proto-Bantu is that I reconstruct a vowel harmony

system based not on the ATR distinction but on a distinction in primary tongue height, namely high versus non-high. I am unable to name any language outside Bantu which has harmony based on this distinction, but the fact that there are such languages within Bantu is all I need to demonstrate that my reconstruction does not violate any synchronic universal.

There is a further consequence of reconstructing the non-ATR high vowels ɪ, ʊ in Proto-Bantu, and it is a highly significant one: the vowel shift from ɪ, ʊ to the ATR mid vowels e, o which I have to posit to account for the origin of the Bantu languages with (1a), automatically changes the harmony from one based on the high versus non-high distinction to one based on the very much more expected ATR distinction. Now once the harmony is rebased on the ATR distinction, we should not be surprised to find further changes taking place to bring the harmony into line with what we expect in an ATR-based system. One thing we certainly do not expect in an ATR-based system is the front versus back asymmetry, and I therefore propose to reconstruct the asymmetry in Proto-Bantu and say that it is automatically eliminated wherever the harmony is rebased on the ATR distinction as a consequence of the vowel shift from ɪ, ʊ to e, o.

Just as the non-ATR high vowels ɪ, ʊ survive unchanged from Proto-Bantu to Proto-Savanna Bantu, so of course does the asymmetry in the harmony.

In the next two sections I draw attention first to a non-Savanna Bantu language, namely A.44 Nen, which provides strong supporting evidence for the reconstruction of the non-ATR high vowels ɪ, ʊ in Proto-Bantu, and then to an aspect of the rigorous comparison of Proto-Bantu with Proto-Potou-Tano which supports my present proposals in two ways: first, it supports the reconstruction of the front versus back asymmetry in Proto-Bantu, and second, it offers an explanation of the origin of the highly unexpected high versus non-high vowel harmony system that I find myself forced to reconstruct in Proto-Bantu.

4. NEN (BANTU A.44)

Nen, the non-Savanna Bantu language in question, is on the northern border of the northwestern Bantu area. Dugast (1971:28–33) reports that this language has the eight vowels i, e, ɛ, a, ɪ, ʊ, o, u and a system of vowel harmony, but does not specify a feature category on which she considers the harmony to be based. Stewart and Van Leynseele (1979:38) note that the eight vowels are the same as the eight vowels of Lobiri (Gur) as described by Wilson (1962), and that Nen lends itself to being analysed in the same way as is Lobiri by Wilson, namely as having an underlying ATR-based cross-height vowel harmony system with the ten underlying vowel phonemes in (3). By this analysis, the high non-ATR vowels ɪ, ʊ are presumed to merge with their non-high ATR counterparts e, o on the surface.

(3) -ATR ɪ ɛ a ɔ ʊ
+ATR i e ə o u

As Stewart and Van Leynseele acknowledge, the legitimacy of mergers such as the latter in a synchronic account has been challenged, notably by Ford (1973). Ford discusses comparable vowel harmony situations in Avatime (Ka-Togo by Williamson and Blench's (2000) classification) and a number of other Ka-Togo and Na-Togo languages in which

Wilson's followers would presumably posit underlying high non-ATR vowels ɪ, ʊ which merge with their high ATR counterparts i, u on the surface, and he concludes that "[absolute neutralization] rules [such as this] are simple, look natural, and in a way account for the data, but they can hardly be said to account for the [native speaker's] competence" (1973:68). Stewart and Van Leynseele, however, draw attention to the fact that "according to Wilson (personal communication), some Lobiri speakers are reliably reported to maintain the distinction between ɪ, ʊ and e, o" and suggest that "the competence of at least some Avatime [or Lobiri or Nen] speaker-hearers who do not use ɪ, ʊ in speaking may none the less involve the recognition of ɪ, ʊ in the speech of older...speaker-hearers." By this view the subsequent discovery by Schuh (1995) that the ɪ, ʊ versus i, u distinction is in fact alive and well in Avatime is not unexpected, as it parallels the earlier discovery that the ɪ, ʊ versus e, o distinction is alive and well in Lobiri.

The system of eight and only eight surface vowels reported by Dugast has however been subsequently confirmed in a detailed study of Nen vowel harmony by Mous (1986), who, unlike Stewart or Van Leynseele, had had the benefit of a visit to the field: Mous finds no evidence of the survival of an ɪ, ʊ versus e, o distinction. He rejects Stewart and Van Leynseele's underlying ɪ, ʊ. My own view is that we need not go this far even if we do accept that there is no ɪ, ʊ to be found on the surface. The competence of the Nen speaker still involves an awareness of (i) a distinction between an o which operates as a ordinary member of the [+ATR] harmony set and an o which operates as a member of the [-ATR] set, and (ii) the fact that the latter o operates as the [-ATR] counterpart of u. I suggest that this justifies the specification of the latter o as [+high, +round, -ATR]. It would similarly justify the specification of e as [+high, -round, -ATR] in virtually all cases.

For our present diachronic purpose, however, what matters here is that Pre-Nen almost certainly did at one time have all ten of the vowels in (3) and a classic ATR-based cross-height vowel harmony system, whether the subsequent neutralization of the contrast between the high non-ATR vowels ɪ, ʊ and their non-high ATR counterparts e, o was absolute, as is argued by Mous, or affected performance only and left competence unaffected, as a superficially identical neutralization appears to have done in the variety of Lobiri described by Wilson.

What is significant about this Pre-Nen situation is that it is readily derivable from a Proto-Bantu with system (1b), as I am about to show, but could be derived only at great cost from one with system (1a). The derivation which follows is a revised and more detailed version of an earlier one (Stewart 1983:33–35). The data are from Dugast's dictionary (1967) and grammar (1971).

One step in the derivation which I propose is the replacement of ɪ, ʊ with e, o, a change which, I have suggested above, has affected a large proportion of the non-Savanna Bantu languages in a number of genetically independent parallel developments. The Pre-Nen case appears to be unique in that the replacement takes place only after its input has been bled by a [+ATR] spreading process whereby Proto-Bantu ɪ, ɛ, a, ɔ, ʊ are replaced with i, e, ə, o, u in words containing i, u. This ordering of the replacement after the [+ATR] spreading would count heavily against any hypothesis that the Nen e, o from Proto-Bantu ɪ, ʊ shared a common genetic origin with the e, o from Proto-Bantu ɪ, ʊ of, say, the languages of Zone C.

The two diachronic processes are readily illustrated by nouns and extended verb stems in which the noun stem, verb root, or verb extension, though not necessarily the noun prefix, goes back to a Proto-Bantu form not containing ɪ or ɛ. The noun prefix

may go back to a Proto-Bantu form containing ɪ; no Proto-Bantu noun prefix form contains ɛ. The main reflexes of the Proto-Bantu vowels are derived as in Table 1 in the contexts specified.

Table 1. The derivation of the Nen reflexes of certain Proto-Bantu vowels in certain contexts (see text)

Proto-Bantu	i	ɪ	a	ɔ	ʊ	u
[+ATR] spreading	i	ɪ/i	a/ə	ɔ/o	ʊ/u	u
ɪ, ʊ > e, o		e/i			o/u	
Nen	i	e/i	a/ə	ɔ/o	o/u	u

The two new sounds ə and o introduced by [+ATR] Spreading are presumed to have been subphonemic in the first instance, but to have quickly acquired the phonemic status which would have confirmed them as participants in a true cross-height vowel harmony system. That they did at some stage acquire phonemic status is clear, as there are many examples in the present-day language of one-vowel verb roots and noun stems either with ə or with an o which is not from Proto-Bantu ʊ. These, like verb roots and noun stems with i or u, take the [+ATR] variants of verb extensions and noun prefixes; for an example with the verb root **-fə̀ŋ** 'exchange' see (5b) below. Precisely how these vowels acquired their phonemic status is not clear, but one possibility is that errors were made in the synchronic derivation of the base forms of verb roots with historic a or ɔ from forms in which these vowels had been replaced with ə or o before an extension with i; compare the example with **-fə̀ŋ** 'exchange' in (5b) with that in (5d). We shall see later, in (8), examples of verb roots in which ə appears to go back to historic ɛ.

The e, o resulting from the change ɪ, ʊ > e, o are transharmonic: although now [+ATR], they operate in the new cross-height vowel harmony system as if they were still the [-ATR] sounds ɪ, ʊ from which they are derived. Transharmonic o is distinguished solely by this property from the phonetically identical straight harmonic o which operates as the [+ATR] counterpart of ɔ. The derivations in Table 1 are illustrated by the examples in (4).

(4)				
	***-bád-**	marry	**-bàl**	
	***-dá**	abdomen	**tò-nà**	prefix vowel transharmonic
	***-tátù**	three	**-làl**	
	***-bòd-**	become rotten	**-fɔ̀n**	
	***-dób-**	fish with line	**-nɔ̀f**	
	***-kòb-**	hook up	**-ɔ̀f**	
	***-cùk-**	wash	**-sò**	vowel transharmonic
	***-tú**	head	**mò-ló**	both vowels transharmonic
	***-túdò**	chest	**è-tón**	both vowels transharmonic
	***-bɨ́**	excreta	**tù-bì**	[+ATR] spread to prefix
	***-bɨ́dà**	oil palm	**nì-bíl**	[+ATR] spread to prefix
	***-dɨ́bá**	water	**m^{w}à-nìf**	[+ATR] spread to prefix
	***-tɨ́d-**	forge	**-lún**	
	***-tɨ́kù**	night	**bù-lù**	[+ATR] spread to prefix
	***-tɨ́ɨ́tɨ́**	bump	**ì-tùt**	[+ATR] spread to prefix

The operation of the vowel harmony within the extended verb stem is illustrated by the examples in (5); (5a)–(5b) illustrate the inversive extension **on**, and (5c)–(5d) the causative extension **i**.

(5) a. No straight harmonic [+ATR] vowel in root or in extension

-fàk	be caught, stuck	**-fàk-òn**	set free
-fɔ́t	crush with hammer	**-fɔ́t-ón**	straighten bent object

b. Straight harmonic [+ATR] vowel in root but not in extension

-tùŋ	attach	**-tùŋ-ùn**	detach
-fəŋ	exchange	**-fəŋ-ùn**	reverse an exchange

c. Straight harmonic [+ATR] vowel in extension but not in root

-fàk	be caught, stuck	**-fək-ì**
-fɔ́t	crush with hammer	**-fót-ì**
-ból	disappear	**-búl-ì**

d. Straight harmonic [+ATR] vowel both in root and in extension

-tùŋ	attach	**-tùŋ-ì**
-fəŋ	exchange	**-fəŋ-ì**

Further diachronic processes have to be posited to account for those nouns and extended verb stems in which the noun stem, verb root or verb extension does go back to a Proto-Bantu form containing **ɪ** or **ɛ**. I propose to derive the main reflexes of the full set of seven Proto-Bantu vowels as in Table 2 in extended verb stems and in noun stems; I shall look separately at what happens in noun prefixes.

Table 2. The main reflexes of the Proto-Bantu vowels in Nen stems

Proto-Bantu	i	ɪ	ɛ		a	ɔ	ʊ	u
[+ATR] Spreading	i	ɪ / i	ɛ / e		a / ə	ɔ / o	ʊ / u	u
e > ə			ɛ / ə					
ɪ, ʊ > e, o		e / i					o / u	
stem e > ɛ		ɛ / i						
(ɛ / i ousts ɛ / ə in lexical items)			ɛ / ə	(ɛ / i)				
Nen	i	ɛ / i	ɛ / ə		a / ə	ɔ / o	o / u	u

As we see in Table 2, two additional sound changes are posited. First, **e** merges with **ə** 'before' **ɪ**, **ʊ** become **e**, **o**. The two changes are presumed to be simultaneous, and to constitute a double shift, or push-chain: **ɪ**, **ʊ** become **e**, **o**, merging with the existing **o** in the case of the **o**, but, in the case of the **e**, displacing the existing **e**, which becomes **ə**, merging with the existing **ə**. This means that whereas **ɪ**, **ʊ** > **e**, **o** results in the sound **o** becoming ambivalent in the sense that we have to recognize a distinction between transharmonic **o** and straight harmonic **o**, it does not result in the sound **e** becoming ambivalent in this sense as straight harmonic **e** no longer exists and **e** is thus invariably transharmonic.

The second additional sound change, which applies only after straight harmonic **e** has been eliminated, is that **e**, which is now invariably transharmonic, becomes **ɛ** in

stems, merging with the existing **ɛ**. This finally eliminates **e** from stems altogether, and changes the existing alternation **e / i** to a new true [-/+ATR] alternation **ɛ / i**.

There is a further development in the wake of the **e** > **ɛ** merger. The alternation **ɛ / ə** is ousted by **ɛ / i** in verb roots and noun stems, though it does survive in the only extension in which it is posited, namely the diminutive extension **ɛl / əl**. If there had been no such further development, the post-merger lexical items with **ɛ** would have had to be marked to distinguish between (i) those in which the **ɛ** had the vowel harmony counterpart **i** (generally those that went back to Proto-Bantu **ɪ**) , and (ii) those in which it had the vowel harmony counterpart **ə** (generally those that went back to Proto-Bantu **ɛ**). It was only to be expected that one of the two [+ATR] sounds **ə** and **i** would oust the other as the vowel harmony counterpart of the post-merger **ɛ**.

The operation of the vowel harmony within extended verb stems containing **ɛ** either in the root or in an extension is illustrated by the examples in (6) of stems with the root **-bés** 'split', the applicative (appl) extension **ɛn(/in)**, or the diminutive (dim) extension **ɛl(/əl)**.

(6)	**-bés**	split	appl	**-bés-én**	dim	**-bés-él**	causative	**-bís-ì**
	-tìŋ	attach	appl	**-tìŋ-ìn**	dim	**-tìŋ-èl**	causative	**-tìŋ-ì**

Within the extended verb stem, no evidence survives of the **e** > **ə** merger apart from the **ɛ / ə** alternation displayed by the diminutive extension **ɛl**, as it is only in that extension that the **ɛ / ə** alternation is not subsequently ousted by **ɛ / i** in the wake of the **e** > **ɛ** merger. The reader might well ask why we should not drop the **e** > **ə** merger, say that it is the original **ɛ / e** alternation itself that is subsequently ousted by **ɛ / i**, and dismiss the diminutive extension as irregular. One possible answer might be that we would have to specify the input to the **e** > **ɛ** merger not just as **e** but as transharmonic **e**, and we hesitate to specify sound changes otherwise than purely in terms of sounds. There is also some evidence to suggest that the **ə** from **e** > **ə** has survived in other contexts which are as yet less well understood; a brief account follows.

In the noun stems in (7), Proto-Bantu has in final position an **i** or **u** (CB **į** or **ų**) which survives unchanged in Nen, and in first vowel position an **ɛ** or **ɔ** (CB **e** or **o**) which has the reflex **ə** or **o**, respectively, in Nen. It looks as if the **ɛ**, **ɔ** first became **e**, **o** by [+ATR] Spreading, and that the **e** went on to become **ə** by **e** > **ə**.

(7)	***-dèdų̀**	beard	**-tə̀lù**	
	***-jègų̀**	elephant	**-sə̀k**	
	***-nòdį̀**	bird	**-nònì**	
	***-dòòdį̀**	whistling	**-lòlì**	whistle

In the verb stems in (8), Proto-Bantu **ɛ** (CB **e**) has the reflex **ə** in Nen. (I assume in (8a) that the Proto-Bantu and the Nen forms display different verbal extensions.) The Nen roots appear, like the example **-fə̀ŋ** seen earlier, to be derived from [+ATR] variants of forms which were originally [-ATR].

(8)	a. ***-pépuk-**	be light in weight	**-hə́hə́n**	
	b. ***-tèèm-**	burn (intr.), blaze up	**-tə́m**	crackle (of fire)

We must now look at what happens in noun prefixes. The examples in (9) of the class 5 prefix **nè** illustrate the general synchronic rule that the transharmonic **e**, where

not replaced with **i** to meet vowel harmony conditions, becomes **ɛ** if the first vowel of the stem is **ɛ** but remains unchanged otherwise:

(9)		**nè-sɛ̀k**	termite
	but	**nè-bàt**	cloth
		né-hɔ̀k	axe
		nè-bók	forehead
	cf.	**nì-bíl**	palm tree
		nì-fù	bundle

Diachronically, it would seem that when transharmonic **e** merged with **ɛ** in stems, any transharmonic **e** in an attached prefix also became **ɛ**; and that the transharmonic **e** which would otherwise have survived in prefixes before stem **ɛ** from Proto-Bantu **ɛ** was ousted by **ɛ** in that context, so that thereafter prefixes with **e** in their base form always had **ɛ** before stem **ɛ**.

The derivations in Table 2 of Nen **ɛ** from the two different Proto-Bantu sources **ɪ** and **ɛ** are illustrated by the examples in (10a) and (10b), respectively.

(10)	a.	***-bìd-**	boil up	**-fɛ̀n**	boil (liquids)
		***-dí-**	eat	**-né**	
		***-dìd-**	cry, wail	**-lɛ̀l**	
		***-tí**	tree	**bò-lɛ́**	
		***-tímà**	heart	**mò-lém**	
	b.	***-gènd-**	walk, travel	**-kɛ̀nd**	
		***-pèèm-**	breathe (hard)	**-hɛ̀m**	breathe noisily
		***-pèèp-**	blow	**-fɛ̀f**	
		***-cèkè**	sand	**mò-sé**	
		***-céndé**	thorn	**è-sènd**	

5. VOWEL HARMONY IN THE COMPARISON OF PROTO-BANTU WITH PROTO-POTOU-TANO

I pass on now to what we can learn from the rigorous comparison of Proto-Bantu with Proto-Potou-Tano. I take as my point of departure the conclusions I reach in my article "An explanation of Bantu vowel height harmony in terms of a Pre-Bantu nasalized vowel lowering" (Stewart 2000). These conclusions will be greeted with scepticism by some who have not seen the article, but I can only ask them to reserve judgement until they have. I note in the article that although the vowel height harmony displayed by certain verbal extensions in Bantu languages has often been compared with the ATR harmonies of non-Bantu Niger-Congo languages such as Akan and Igbo, it has never been shown to be cognate with them. As I go on to show, it is cognate instead with a nasalization harmony which is found in some languages of the Tano group and which has been reconstructed in Proto-Tano. The sound correspondences across Potou-Tano and Bantu provide strong evidence in support of two hypotheses: first, that the nasalization harmony goes back to Proto-PTB, and second, that the nasalized non-ATR high **ĩ** of Proto-PTB is lowered to non-high **ɛ̃** at some stage of Pre-Bantu. This nasalized vowel lowering, in applying to sequences such as **ĩ - ĩ**, introduces a complication into the nasalization harmony, which now incorporates a secondary vowel

height harmony based on the high versus non-high opposition. Both harmonies survive in Proto-Bantu and in present-day UMbundu R.11 in the extreme west of the Bantu area. In the non-northwestern Bantu languages other than UMbundu, however, vowel nasalization is lost and only the vowel height harmony survives intact; a trace of the lost vowel nasalization harmony does survive in many of UMbundu's neighbours in the nasal consonant harmony displayed by the verbal extensions in question, but in the eastern Bantu languages there appears to be no trace of it whatsoever.

We thus have a plausible explanation of the origin of the highly unexpected type of vowel harmony system that we are forced to reconstruct in Proto-Bantu, namely one in which the harmony is based on the primary vowel height distinction high versus non-high. In our comparative PTB studies we have thus now traced both the creation of this unexpected vowel harmony system as an accidental consequence of one sound change, and its conversion into one based on the highly expected ATR versus non-ATR distiction as an accidental consequence of another sound change.

We also have a measure of confirmation of our reconstruction of the front versus back asymmetry in Proto-Bantu, for while the sound correspondences provide strong evidence that Proto-PTB high **ĩ** was lowered to non-high **ɛ̃** by a Pre-Bantu nasalized vowel lowering, they also provide evidence that the back counterpart of **ĩ**, namely **ũ**, was left unaffected by this lowering. This suggests of course that when the vowel harmony based on high versus non-high was first introduced, extensions with back vowels were unaffected. It could well be that they came to be affected only at a later stage as a consequence of a partial generalization of the vowel harmony to them, but as yet I have been unable to find any direct evidence that would confirm this.

6. CONCLUSION

The case for reconstructing Proto-Bantu with the non-ATR high vowels **ɪ**, **ʊ** still falls far short of being universally accepted, despite its strength. A major obstacle, I suggest, has been a widespread misconception of the relevance of universals in the reconstruction process. It is often assumed that where we have to decide which, if any, of a number of rival corresponding sounds or systems should be reconstructed in the protolanguage, we should normally favour that sound or system which is most expected cross-linguistically. In fact, however, we should normally favour that sound or system from which the others can be derived at the lowest possible cost in terms of cross-linguistically unexpected processes. In many cases this will not be the sound or system which is most expected, as it frequently happens that where a more expected sound or system corresponds to a less expected one in the daughter languages, the less expected one has been inherited unchanged from the protolanguage and the more expected one has been derived in an expected way. A good example is provided by the Central Tano languages. The voiceless labial velar **kp** of Anyi and Baule in the west corresponds to the simple voiceless labial **p** of Akan in the east, as we see if we compare the bottom lines in (a) and (b) in Table 3. In Anyi and Baule there is no labial velar apart from **kp**, and there is no simple **p**, while in Akan there are no labial velars at all. It would be a mistake to reconstruct the more expected simple **p** in Proto-Central Tano and derive the **kp** of the Western subgroup from it. The correct solution is to reconstruct the **kp** shown in Table 3, since a simplification of **kp** to **p** is expected and a change from a simple **p** to **kp** is not.

Table 3. Derivations of the reflexes of Proto-Tano
***kp, p, f** (a) in Anyi and Baule, and (b) in Akan

a. Proto-Tano	**kp**	**p**	**f**
f > h			**h**
p > f		**f**	
Proto-Central Tano	**kp**	**f**	**h**
Proto-Western Central Tano	**kp**	**f**	**h**
Anyi and Baule	**kp**	**f**	**h**
b. Proto-Central Tano (derived as in (a))	**kp**	**f**	**h**
kp > p	**p**		
Akan	**p**	**f**	**h**

The reconstruction of the labial velar in Proto-Central Tano has the further advantage that it provides a better platform for the reconstruction of protolanguages ancestral to Proto-Central Tano, and in particular the most recent of these, namely Proto-Tano. Proto-Tano is reconstructed with both **p** and **kp**, as we see in (a) in Table 3, and there is virtually no room for doubt as to how the Central Tano situation arose: Proto-Tano **p** became **f** in all contexts, and as a result Proto-Central Tano had no **p** although it still had **kp**. If we had already reconstructed the more expected simple **p** in Proto-Central Tano, we would now have to say that Proto-Tano **kp** became **p** in Proto-Central Tano, and that this **p** reverted to **kp** in Proto-Western Central Tano and survived in the daughter languages Anyi and Baule.

I suggest, then, that those who continue to be favour the vowel system **i e ɛ a ɔ o u** over **i ɪ ɛ a ɔ ʊ u** in the reconstruction of Proto-Bantu do so primarily for two equally invalid reasons: first, the vowel system is more expected in itself, and second, the ATR-based harmony that comes with it is very much more expected than the harmony based on high versus non-high that comes with the less expected system.

REFERENCES

Dugast, Idelette. 1967. Lexique de la langue tunen. Paris: Klincksieck.

Dugast, Idelette. 1971. Grammaire du tunen. Paris: Klincksieck.

Ferguson, Charles A. 1963/1966. Assumptions about nasals: A sample study in phonological universals. In Joseph H. Greenberg (ed.), Universals of language, 33–60. Cambridge Mass.: MIT Press.

Ford, K. C. 1973. On the loss of cross-height vowel harmony. In M. E. Kropp Dakubu (ed.), Papers in Ghanaian linguistics, Research Review suppl. 4:50–80. Legon: Institute of African Studies, University of Ghana.

Heine, Bernd. 1973. Zur genetischen Gliederung der Bantu-Sprachen. Afrika und Übersee 56:164–185.

Henrici, Alick. 1973. Numerical classification of Bantu languages. African Language Studies 14:82–104.

Hyman, Larry M. 1999. The historical interpretation of vowel harmony in Bantu. In Jean-Marie Hombert and Larry M. Hyman (eds.), Bantu historical linguistics: Theoretical and empirical perspectives, 235–295. Stanford: Center for the Study of Language and Information.

Greenberg, Joseph H. 1966. Synchronic and diachronic universals in phonology. Language 42.2:508–517.

Guthrie, Malcolm. 1967-71. Comparative Bantu. 4 vols. Farnborough: Gregg.
Maganga, Clement and Thilo C. Schadeberg. 1992. Kinyamwezi: Grammar, texts, vocabulary. Köln: Koppe.
Meeussen, A. E. 1967. Bantu grammatical reconstructions. Africana Linguistica 3:79–121.
Mous, Maarten. 1986. Vowel harmony in Tunen. In Koen Bogers, Harry van der Hulst, and Maarten Mous (eds.), The phonological representation of suprasegmentals. Publications in African Languages and Linguistics 4:281–295.
Schadeberg, Thilo C. 1994/95. Spirantization and the 7-to-5 vowel merger in Bantu. In Marc Dominicy and Didier Demolin (eds.), Sound change. Belgian Journal of Linguistics 9:73–84.
Schuh, Russell G. 1995. Aspects of Avatime phonology. Studies in African Linguistics 24:31–67.
Stewart, John M. 1970. Tongue root position in the Volta-Comoe languages and its significance for the reconstruction of the original Bantu vowel sounds. African Language Studies 11:340–350.
Stewart, John M. 1971. Niger-Congo, Kwa. In Thomas A. Sebeok, Jack Berry, and Joseph H. Greenberg (eds.), Linguistics in Sub-Saharan Africa. Current Trends in Linguistics 7:179–212. The Hague: Mouton.
Stewart, John M. 1983. The high unadvanced vowels of Proto-Tano-Congo. Journal of West African Languages 13.1:19–36.
Stewart, John M. 2000. An explanation of Bantu vowel height harmony in terms of a Pre-Bantu nasalized vowel lowering. Journal of African Languages and Linguistics 21:161–178.
Stewart, John M. 2001. South Volta-Congo (Benue-Kwa) subclassification: The position of Tano (Akanoid). Paper read at the 32nd Annual Conference on African Linguistics, Berkeley.
Stewart, John M. and Hélène van Leynseele. 1979. Underlying cross-height vowel harmony in Nen (Bantu A.44). Journal of African Languages and Linguistics 1:31–54.
Williamson, Kay and Roger Blench. 2000. Niger-Congo. In Bernd Heine and Derek Nurse (eds.), African languages: An introduction, 11–42. Cambridge, England: Cambridge University Press.
Wilson, W. A. A. 1962. The vowel systems of Dagaari and Lobiri. Unpublished ms.