The sounds of Proto Austronesian

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1 Introduction

Reconstruction of the phonology of a protolanguage involves two steps: first, listing of correspondence sets in the data provided by the attested languages and, second, determining the phonetic nature of the reconstructed form. This second step is crucial to an evaluation of the validity of the reconstruction. The history of investigations into the articulatory nature of the reconstructed form of Proto Austronesian (PAn) goes back to the earliest attempts of reconstruction. Dempwolff, in his ground-breaking work of the 1930s, which became the point of departure of all historical studies, presents a phonological system which implies certain articulatory characteristics of the reconstructed sounds. Beginning in the 1950s, a view prevailed that the nature of the sounds of the protolanguage were unknowable and irrelevant to the endeavour of historical linguistics, and this view led to the positing of a plethora of protophonemes — consonants which, if they were real, would have made PAn typologically a language with a larger consonantal inventory than the most complex of the Caucasian or the Salish languages, even though the current An languages across the board have a phonological system small and simple by world standards. Beginning in 1988, studies on the articulatory nature of the PAn consonant phonemes appeared (Wolff 1988; Ross 1992). This paper differs from these earlier works in that here we hypothesise a substantially different inventory of protophonemes than has been proposed heretofore in scholarship on the history of the An languages.

I begin by hypothesising a certain phonemic inventory for the protolanguage. This hypothesis is based on the historical An literature heretofore, starting with Dempwolff and the considerable literature of the past sixty years which has led to substantial modification of what Dempwolff first proposed. Then I test this hypothesis by positing a vocabulary of PAn with the hypothesised phonemes on the basis of the data and determining whether the data from current languages manifest regular reflection of these phonemes. This testing process leads to revisions in the hypothesis. An evaluation of the validity of the hypothesis comes from its ability to explain the development of the attested reflexes of protoforms in terms of natural phonological processes, in terms of changes brought about by analogical processes, or in terms of language contact phenomena. This work of testing this hypothesis is not done, but what I have hypothesised is sufficient to explain the data which I have managed to examine up to this point — that is, to explain the development of the attested forms from the hypothesised protoforms in terms of natural linguistic processes.

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2 The list of the hypothesised phonemes

Chart I gives a list of the hypothesised phonemes. Note some characteristics of this particular inventory which certainly make it an acceptable inventory if indeed the data support it. First, it is a nicely balanced system. Although I am proposing five points of articulation, such as only a few of the currently attested languages manifest, yet it is still very much on the order of what most of the current languages show — that is, there are no multiple sibilants, and the series of voiced apicoalveolar and apicodental stops is not overly rich: I have assumed just **d* and **j*. Nor have I posited the existence of multiple liquids, the articulatory properties of which are unclear. Further, the voiced and voiceless series is completely congruent. The nasals are congruent as well, for they lack only the very back position, and there is very good reason in terms of how these sounds are articulated for that position to be empty.

Chart I: PAn Consonants

voiced consonants[1]	b	d	j	g	ɣ
voiceless stops	p	t	c	k	q
nasals	m	n	ñ	ŋ	–
liquids	w	l	y		
sibilant		s			

Chart IA shows the relation between my hypothesised system and the transcription found in the Austronesian literature.

Chart IA: Wolff's phonemes and traditionally assigned phonemes

Wolff's transcription	Traditional transcription	Wolff's transcription	Traditional transcription
p	p	ɣ	R
t	C, t	m	m
k	k	n	n
none	T,c	ñ	ñ, N, L
q	q	ŋ	ŋ
b	b	l	l
none	d	none	r
d	D	c	s
j	Z	s	S
none	z		
g	j	w	w
none	g	y	y

In addition PAn had four vowels **i, *e, *a, *u*. There was stress contrastive on the word level, which occurred either on the final syllable or on the penult.

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1 This series consists of stop consonants except in the case of the **ɣ*, which is post-velar, a position in which voiced stops are rare. The reflexes of **ɣ* are spirants (or developments therefrom) in all languages except in the languages in which **g* merged with **j* or with **ɣ* (in which case the reflex has a sound [g], for there was room for **ɣ* to move to an articulation further forward in the mouth).

3 Assumptions underlying the research

This section makes explicit my basic assumptions about language change.

First, we make two default assumptions — that is, assumptions that so-and-so was the case unless there is evidence to the contrary. The first of these is that phonemic contrasts which cannot be documented did not exist. Accordingly, I published studies that aimed to refute phonemic contrasts which my academic progenitors or my colleagues had proposed (Wolff 1975, 1982, 1997). The grounds for eliminating these phonemes were that no forms evinced the supposed contrasts. The irregular correspondences which these forms reflected and which led to the positing of the supposed contrasts are due to the secondary nature of the forms as borrowings, or they are due to analogical changes, or these are not irregular at all but in fact subject to previously unrecognised environmental conditioning. For example, Dempwolff's dotted **ḷ* is evinced only in forms spread by borrowing, and further his two voiced apical phonemes actually fail to contrast. In addition to the dotted **ḷ* there were other phonemes of Dempwolff's which had to be eliminated on the same grounds. Later on I proposed that the accentual pattern for the root provided an environment for explaining the contrasts between **t* and **C* and **N* or **L* and **ñ*: the proposition here is that there were only two phonemes: **ñ* and **t* (Wolff 1991, 1993).

My second default assumption is as follows: although the protolanguage surely had variation (no language is without, for variation plays a crucial role in establishing social order), unless there is evidence to the contrary, only one of two or more variant forms in the protolanguage can be assumed to have come down to modern times and be manifested in the attested data. To be sure, there are times when the only conclusion to draw is that more than one variant came down from the protolanguage, but there should be evidence for the exceptions. This default assumption is akin to Bloomfield's (1984, Chapter 22) account of competing forms, in which he notes on the basis of numerous examples that one of two competing forms gets lost. Indeed there are times when two variants left reflexes in the daughter languages, but we cannot assume such to be the case without evidence to that effect. For example, the form which is reconstructed with the meaning 'sleep' must be reconstructed both as **tiduɣ* and **tuduɣ*. The distribution of the forms with /i/ as opposed to the forms with /u/ is clearly not phonologically conditioned and has absolutely nothing to do with language groupings, geographical location, or anything which we know about language contact that could explain the occurrence of a reflex of /i/ or of /u/ in the penult of this form. This randomness of the occurrence of the /u/ as opposed to /i/ constitutes evidence for the existence of two variants in the protolanguage, both of which survived.

The most important group of assumptions has to do with the kind of changes which occur and the way in which they occur. First, changes have to be phonologically motivated — that is, the changes develop in conformity with articulatory processes found throughout the languages of the world: for example, assimilation and weakening of an unstressed syllable in languages which have heavy stress, and also in accordance with specific characteristics of Austronesian languages — most importantly, the 'pull' of the canonical disyllabic shape of the root. For example, in the case of a language which manifests intervocalic /-p-/ in a morpheme which is cognate with one in which a sister language manifests intervocalic /-v-/, a hypothesis that an earlier **p* became /v/ makes sense, for this is assimilation to the environment, but the reverse would not be true except in a very special situation. Thus Gitua, a language from New Guinea (Ross 1988:50), reflects PAn **p* with /p-/ initially and /-v-/ medially: PAn **paŋudan* 'pandanus' > Gitua *pada* 'pandanus', cf. Malay *pandan* 'pandanus'; Proto Oceanic **nipi* 'dream' (a re-formation of PAn **sinupi*) > Gitua *vivi*

'dream'(the initial consonant having been changed by an analogical process), cf. Malay *mimpi* 'dream'. Similarly, **s* may and often does become /h/, but the reverse is, as far as I know, not attested.

The reshaping of roots to fit a canonical disyllabic shape has enabled us to reconstruct monosyllabic roots and bring together as a single reconstructed morpheme two, three, and more disparate morphemes with a common meaning (Wolff 1999). For example, for the word 'eat' it is possible to bring together a large number of widely attested and very different forms which derive from one root **kan*: by stretching out the monosyllabic form to two morae, we can connect this root with Ceb *kaʔun* 'eat' and Mongondow *kaʔan* 'eat', whose vowels otherwise would not correspond. Further, we can connect forms which were made disyllabic by re-analysing an affix as a part of the root, even though the affix does not occur currently in the language which manifests this. Thus Malay *pakan* 'feed' is derived from **kan* even though the affix **pa-* is no longer found in Malay. Monosyllabic roots may be made disyllabic by adding a prothetic vowel, as for example in the word for 'coconut'. By hypothesising **ñuɣ* we can connect Ngaju *eñuh* which was disyllabised by adding a prothetic vowel and Malay *ñiur*, which was disyllabised by stretching out the vowel nucleus.

Another example of phonologically motivated change is this: specific phonological characteristics of the protolanguage predetermined changes which occurred. The stress patterns of the protolanguage led to vowel weakening and loss of syllables. We must assume that the accented syllables were pronounced with greater force than the unstressed — i.e. accent primarily involved stress rather than length (although the stressed vowels may indeed have been longer than the unstressed), for this explains the vowel weakening and loss of syllables. In addition certain forms were cliticised (stress-less), and this fact accounts for the various reflexes of these forms found in the data. For example, the word for 'one' is manifested variously as reflecting three protoforms **ica*, **ca* and **eca*.[2] If we assume that this word was typically a clitic (as its reflexes are in most of the currently attested An languages), it is possible to reconstruct only one morpheme **ica* and show that the forms which reflect **ca* and **eca* in fact developed from **ica* by the phonological processes just described. **ca* developed from **ica* by syncope of the initial syllable when in proclitic position, as is widespread in the antepenult of any number of forms in developments throughout the Austronesian area. After **ca* became generalised to stressed position, the form **eca* developed from **ca* by the process of disyllabisation of monosyllabic roots.

Second, we make assumptions about the way sound change takes place — namely, that sound change proceeds on a word-by-word basis, and it is not completed until all forms with the phoneme in a given environment have been replaced by the innovation. These assumptions are based on the discovery by Labov and others in studying on-going changes in English that sound change proceeds morpheme by morpheme within a community as part of the process of creating social structure, and that the change does not begin by replacement of the earlier phonological shape but by the creation of an alternative pronunciation of individual items which then compete with the original and often (but not always) replace it. This implies that the sound change may at times not be carried out to completion. In this way it provides a considerable refinement of the principle enunciated more than 100 years ago by Brugmann that 'sound-laws admit of no exceptions'. We can now say that they admit of no exceptions when they have been completed, but when they remain uncompleted, they show exceptions in the form of changes that never got made. Although it is possible in the

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2 Examples are as follows: PAn **ica* > Paiwan *ita*, Sa'a *ite*; PAn **ca* > Samoan *sa*, Ratahan *sa*; and PAn **eca* > Cebuano *usa*, Tondano *esa*.

literature to find citations from Austronesianists who pay lip-service to the Neo-grammarian principles of the unexceptionality of sound changes, in fact it is tacitly agreed that indeed there are changes which show exceptions.

An example is found in the history of Javanese. An important change in the development of Javanese is the merger of PAn **d* and **g* as /r/. Only it is not a complete merger. Some forms with **d* become retroflexed /dh/ (i.e. remain unchanged), and a good proportion of these are in fact doublets of forms with /r/ (e.g. **deŋeŋ* 'hear' > Old Javanese *dhengö* and *rengö*.) Now in the case of this particular Javanese development, people have wiggled out of admitting that sound changes may indeed have exceptions by resorting to language contact phenomena to explain the double reflexes, for Javanese was in contact with Malay and strongly influenced by Malay throughout its known history. Malay reflects PAn **d* as /d/, and Javanese borrows with a retroflexed /dh/ forms which in Malay had /d/. In this way it is possible to maintain that Javanese 'borrowed' the forms with /d/ and rescue the Neo-grammarian hypothesis in its pristine form.

However, there is much to indicate that a hypothesis of borrowing does not hold water. First, there are about as many forms which reflect **d* with retroflexed /dh/ as those which reflect this phoneme with /r/, and there is nothing about their semantic characteristics which would induce borrowing of them. Second, a number of these forms do not even occur currently in Malay, so that we would have to assume the occurrence of forms which now no longer exist at an older stage of Malay with which Javanese was in contact. In short, borrowing cannot explain the forms with retroflexed /dh/, and a hypothesis that the change of **d* to /r/ remained incomplete, very much like the incomplete changes which Labov (1994, Parts C and D) adduces for English, makes much more sense. We find similar phenomena of double reflexes that can only be laid to sound changes which did not spread in the vocabulary of languages over the entire Austronesian area from west to east.

4 The articulatory features of the protophonemes

Now that we have the basic assumptions that underlie the methodology, we can finally get to the topic of this paper: what the PAn phonemes sounded like. Chart II lists six reconstructed forms and their reflexes in a language from each of Taiwan, the Philippines, Sumatra, Java and Borneo, along with Malay. This does not cover the entire range of data which shed light on the articulatory characteristics of these phonemes, and we will adduce additional data to elucidate the nature of other phonemes in Pan.

Chart II: Selected forms in six An languages and the PAn reconstructions for them

Meaning	rice	heavy	rot	be flat	road, way	weaver's sword
Reconstruction	**beɣas*	**beɣeqat*	**buyuk*	**dayat*	**jalan*	**baliga*
Paiwan	*vat* 'grain'	*v'qatj*	*vuk*	*kazatjan* 'level land'	*djalan*	*valida*
Cebuano	*bugas*	*bug?at*	*buguk*	*dágat* 'sea'	*dálan*	*balíla*
Toba Batak	*boras*	*borat*	*buruk*	*darat* 'land'	*dalan*	*baliga*
Old Java	*w'as*	–	*wuuk*	*raat* 'world'	*dalan*	*walira* 'part of loom'
Ngaju Dayak	*behas*	*behat*	–	–	*jalan*	–
Malay	*b'ɣas*	*b'ɣat*	*buɣu?*	*dayat* 'land'	*jalan*	*b'liya*

Chart IIA: Reconstructed reflexes for the forms listed in Chart II

PAn	*b	*d	*j	*g	*ɣ	*qeɣ[2]	*c	*t	*k	*ə	*a	*u	*i	*ŋ
Paiwan	v	z, j[1]	z, j[1]	d	Ø	q	t	tj	k	ə	a	u	i	ʔ
Cebuano	b	d	d	l	g	g[ʔ][2]	s	t	k	u	a	u	i	ŋ
Toba Batak	b	d	d	g	r	r	s	t	k	o	a	u	i	n
Old Javanese	w	r	d	r	Ø	Ø	s	t	k	ə	a	u	i	ŋ
Ngaju Dayak[3]	b	r	j	r	h	h	s	t	k	e	a	a	i	ŋ
Malay	b	d	j	ɣ	ɣ	ɣ	s	t	ʔ	ə	a	u	i	ŋ

1 This **d* and **j* fell together in Paiwan and are reflected by two phonemes /z/ and /j/ (written *dj*). Probably the intervocalic reflex was /-z-/ and the initial and preconsonantal reflex was /j/, but analogical developments have obscured this distribution.

2 This sequence is reconstructed on the basis of forms not listed here. Cebuano shows metathesis and syncope.

3 Not all of the Ngaju Dayak reflexes are illustrated in Chart II.

4.1 Voiced stops

First, let us look at the voiced stops. Note that the changes which Charts II and IIA imply are totally natural from the articulatory point of view. The voiced stops continue to be pronounced as voiced stops in the languages illustrated here except for Javanese, where lenition has replaced voicing as the distinctive feature which marks this series off from other stop consonants. The labials remain labials and the consonants which are articulated in the front of the mouth continue to be articulated in the front. The velar consonants which tend to be unstable do indeed change their points of articulation in several of the languages here illustrated. Further, in Javanese and Paiwan **b*, **d*, and **ɣ* develop in entirely analogous and natural ways, where **b* and **d* lose the occlusive feature entirely and become spirants or taps, and **ɣ* becomes lost altogether. Although not all voiced stops are weakened in all positions, there is a palpable consistency in this development which allows us to be secure in the conclusion that these stops were in fact voiced stops. Further, it is unequivocal that the point of articulation implied by the symbols of the chart are in fact the distinctive features of the PAn consonant inventory.

However, the chart does not show this entirely. First is the nature of the **d*/**j* distinction, for further data indicate it to be problematic. Although the chart does not show this, in fact Javanese reflects **d* with a retroflexed /dh/ as well as with /r/. Rukai, an Austronesian language from Taiwan, also reflects these two phonemes with an apicodental and a slightly retroflexed apical stop. Ross (1992) argued that the nature of the distinction in PAn was one of apicodental versus apicoalveolar or retroflex because this is the distinction found in two widely separated languages. Other languages provide little evidence one way or the other as to the nature of the difference, whereas the languages which clearly show a palatalised versus a non-palatalised reflex are contiguous. However, it should be noted that there is no great difference from an articulatory point of view in a contrast consisting of (1) apicodental articulation versus apical stop with slight retroflexion or (2) a contrast consisting of palatalised versus an unpalatalised apical stop. In short, **j* may actually have not been a palatal at all, or at least it developed a non-palatal pronunciation in Rukai, Javanese, and other languages as well.

As to the articulatory features of **g*: we note that in languages in which **g* has not merged with other phonemes it has a voiced alveolar stop reflex medially and finally, but initially it very often has a voiceless velar stop reflex [k]. On the other hand, if **g* was lost, it was by merger with other phonemes, and the nature of the merger can only lead to the conclusions that **g* was a voiced velar stop. In most languages in which **g* has been lost, it has merged with **j*. This fact has led previous scholars to assume a palatalised articulation for **g*, and most certainly **g* was fairly forward — if only to keep it apart from **ɣ*. In Javanese and some other languages **g* merged with **d* rather than **j*. This would make sense if **j* was an apical stop of some sort, and it did develop into that in Javanese. On the other hand **ɣ* merged with **g* in some languages. It makes sense to reconstruct [g] as the value of **-g-* for one more reason: namely, **g-* [g] has to be reconstructed for initial position. This means that a *g*-like sound in medial position must have been the same or nearly the same.

Finally **ɣ*: a voiced back spirant or possibly a back stop (which is acoustically almost indistinguishable from a back spirant) is the only sound which can explain the reflexes of **ɣ*. Chart IIA illustrates the following reflexes of **ɣ*: [ɣ], [g], [r], [h], and ∅. Other languages manifest [l] and [x]. The development of **ɣ* as [x], [h], ∅ involves a devoicing of the **ɣ* followed by a weakening of the voiceless velar spirant to [h] and subsequent complete loss. The change of **ɣ* to [r] and [l] involves a change widespread in the world's languages where a voiced velar spirant becomes a uvular trill and subsequently a tongue-tip trill which may then merge with /l/.

4.2 Voiceless stops

Now for the voiceless stops. Chart III presents data which clarifies the nature of these stops in eight forms from seven languages.

Chart III: Voiceless stops and spirants in seven languages

reconstructed meaning	four	liver	tree	ray of light	one	dog	weep	pull out (sword)
PAn form	**pat*	**qatay*	**kasiw*	**cinaɣ*	**ica*	**acu*	**taɲic*	**sunuc*
Paiwan	*se-patj*	*qatsay*	*kasiw*	*telyar*[1] 'lightning'	*ita*	*vatu*	*tsmangit*	
Amis	*s-pat*	*ʔataɣ*		*cida*	*c-cay*	*waco*	*tomangic*	*hodoc*
Cebuano	*upat*	*atay*	*káhuy*		*isa*		*tangis*	*húnus* 'drawer'
Muna	*fato-*	*ɣate*	*sau*		*ise*	*d-ahu*	–	–
Malay	*empat*	*hati*	*kayu*	*sinar*	*esa*	*gigi-asu* 'canine tooth'	*tangis*	*hunus*
Moken	*pat*	*katay*	*kae*		*sa*		*nangoy*	–
Tongan	*faa*	*ʔate*	*kau*	*maa-hina* 'moon'	*ta-ha*		*tangi*	*unuh-i*

[1] This form is not directly inherited from PAn. The final /r/ does not correspond to Malay /r/. See Chart II.

Chart IIIA: Correspondences of the forms in Chart III

reconstructed phoneme	*p	*t	*c	*k	*q	*s
Paiwan	p	ts, tj[1]	t	k	q	s
Amis	p	t	c	k	qʔ	h[1]
Cebuano	p	t	s	k	Ø, ʔ[1]	h
Muna[1]	p, f	t	s, h	k, s	ɣ	Ø
Malay	p	t	s	k, ʔ[1]	h	Ø, h[1]
Moken	p	t	s	k	k	Ø
Tongan	f	t	h	k	ʔ	Ø

[1] Where there are two reflexes, there is conditioning according to the phonemic environment with some cases of analogical spread. In the case of the Amis reflex of *s: Amis manifests /s/ in some forms in the *s correspondence set, and I have not yet done the research to develop an explanation. The situation is more complex in Muna. Some of the double reflexes arise from phonetic conditioning and analogical spread, but there are other double reflexes which developed when a sound change failed to spread through the entire vocabulary.

The reconstruction of **p* is pretty much self-evident. This is obviously the only sound from which the reflexes in the data could have originated. The /f/ in Tongan is simply a spirantisation of a stop, and this is also reflected in the voiced series (not illustrated here) and it could be argued that /h/ reflecting **c* is another instance of the phenomenon of weakening. Similarly **t* is obviously the only sound from which the reflexes in the data could have originated. Paiwan palatalised or affricated this phoneme, and this process may have been motivated by the depalatalisation of **c* in Paiwan. In any case it is clear that the protophoneme had a sound [t]. It does not make sense to hypothesise a palatal stop for this phoneme in PAn — [c] — for as we shall see immediately following, [c] is the sound which must be reconstructed for forms represented in the third column of the chart. I say the protosound which gave rise to the reflexes exemplified in column three must be reconstructed as **c*, for what other sound can give rise variously to [t], [c], [s], and [h]? We should add to this list the Saisiat reflex palatalised /ß/. In Paiwan (and a number of other languages outside of Taiwan) /t/ is simply a depalatalisation, a natural articulatory development from [c]. The most widespread reflex, /s/, is simply a loss of the stop articulation after the **c* developed a pronunciation [ts], a change similar to that documented for many of the western Romance languages, for the Satem languages of Indo-European, and many others. Tongan /h/ is simply a weakening of an earlier [s], which is manifested in many of the other Polynesian languages.[3]

[3] Dempwolff (1934–38) reconstructed this sound as **t'* (adducing approximately the same sound as I do with **c*). This is remarkably prescient, for none of Dempwolff's languages manifest anything by [s] or what is clearly a development from [s], [h] and Ø. Dempwolff's argument is morphophonemic. That is, in the western An languages (e.g. Malay) in roots beginning with the other stop consonants these initial stops are replaced by homorganic nasals in the morphonemic process which involves nasal replacement. However, for roots beginning with /s/ the /s/ is replaced by /ñ/. This was evidence for Dempwolff (and further evidence for us) that /s/ in Malay and the other Western An languages developed from an earlier palatalised sound.

The reconstruction of **s* fits in perfectly with the reconstruction of **c*. By a natural phonetic change, **s* is weakened to /h/ and then ∅ in some languages, but this happens only in languages in which **c* became /s/ (or became /s/ en route to a further development). In other words, the movement of **s* from its original articulatory features to /h/ is motivated by the development of **c* to /s/, or else the loss of **s* left open the phonetic space for a change of **c* to /s/ without having phonemic merger.

The reconstruction of **k* is uncontroversial. This phoneme is quite stable over the An area, although as we see in Moken and independently in some other languages in the Philippines, on Taiwan, and in Oceania, **k* merges with **q*, but this involved a change in the articulation of **q* rather than **k*. Further, in a few languages **k* became glottalised and the closure with the back of the tongue was lost, resulting in [ʔ].

**q* again must be reconstructed as a postvelar stop, for this is the only sound which could variously have produced [q], [k] [ʔ], [x] (not illustrated in our sample), [ɣ] and [h]. The Amis reflex, a glottal stop with the root of the tongue almost closing the air passage which I symbolise [ʔˤ], is an intermediate stage between the back velar closure [q] and the [ʔ]. The spirantisation of [q] as [x] is a natural development. In fact in the languages which manifest [q] as a reflex of this phoneme, **q* is often articulated with a non-distinctive affricate release — that is, the reflexes of **q* may have affricate allophones. This [x] became voiced in Muna and perhaps other languages, but most frequently it lost its fricative feature and became [h], a natural development paralleled in the history of languages all over the world.

4.3 Liquids and nasals

The liquids and nasals are for the most part stable over the entire An area, and the attested reflexes are with one exception quite similar. We may assume that the articulation of the protophonemes was rather similar to what is generally found as reflexes of them in the documented languages. **w* falls together with the voiced labial stop in a few languages, e.g. Javanese, but this is a matter of weakening of **b* rather than a change of **w*. The phoneme /l/ develops non-lateral articulations in some languages (i.e. becomes [r]), and in some of the languages of Taiwan the reflexes of **l* have a lateral articulation rather different from that found in most of the An languages. /l/ is also velarised and often lost after velarisation. We do not exemplify this phenomenon. It is a natural phonetic development and a widespread process in the the history of languages throughout the world. It took place independently in the An languages which exemplify the phenomenon.

Similarly all the nasals except **ñ* are stable, and except for the fact that some languages lose distinctions in word-final position, the reflexes of these phonemes are pronounced very similarly in the various languages across the area with few exceptions. The phoneme **ñ* has a wide range of diverse reflexes, and we need to look at the reflexes carefully to ascertain the articulatory nature of the protophoneme. Chart IV exemplifies **n*, **l*, and **ñ* in seven languages:

Chart IV: Reflexes of **n*, **l*, and **ñ* in seven languages

reconstructed meaning	six	five	swim	rain	roast	child	float in current
reconstruction	**nem*	**limá*	**ñaŋúy*	**qujáñ*	**tuñú*	**añák*	**qáñuj*
Tsou	*nomə*	*rimo*	*ruu-hnguzu*	*m-əchə*	*chu-a*	*me-ah?o* 'give birth'	*ng-ohcu*
Rukai (Budai)	*ənəmə*	*ríma*	*langoy*	*ódale*	*wa-culo*	*vlakə, la-valakə*	*mw-álodo* 'flow'
Bunun	*nuum*	*hima?*	–	*qudan*	*ma-tunu*	–	*mung-qanu?*
Paiwan	*enem*	*lima*	*lymanguy*	*qudjaly*	*culyu*	*alyak*	*si-qalyudj*
Amis	*q?nem*	*lima*	*dangoy*	*q?orad*	*todoh*	–	*q?alol*[1]
Tagalog	*ánim*	*limá*	*langúy*	*ulán*	–	*anák*	*ánud*
Malay	*enam*	*lima*	–	*hujan*	*tunu* 'burn'	*anak*	*hanyut*

[1] The reflex medial /l/ in place of medial /d/ (the normal reflex of **ñ*) is here probably conditioned by the following /l/.

Chart IV A: Correspondences of **n*, **l*, and **ñ* illustrated in Chart IV

reconstructed phoneme	*n	*l	*ñ
Tsou	n	r	h
Rukai	n	r	l
Bunun	n	h	n
Paiwan	n	l	ly
Amis	n	l	d[1]
Tagalog	n	l	n, l[2]
Malay	n	l	ñ, n, l[2]

[1] Amis /d/ represents a palatalised phoneme with two allophones distributed according to environment (but differently in different dialects) (1) a voiceless palatal [ɬ] or (2) [d] (possibly palatalised [d'] — the literature is unclear).

[2] Malay and many languages of the Philippines and western Indonesia have three reflexes depending on the environment (but redistributed by analogical changes — cf. Wolff 1993). Other languages of the Philippines and Indonesia independently merged earlier **ñ* and **n*.

As for the phonetic characteristics of **ñ*, first, we note that in most of the languages of Taiwan (exemplified here by Paiwan and Amis), the reflex of **ñ* has a feature of palatalisation. In Rukai, this feature was lost (although there is not enough information available about the phonetics of the various Rukai dialects to enable me to state that this feature is not in fact preserved in some of the Rukai dialects). In Tsou it is clear that /h/ derives from a palatalised [ɬ] which was devoiced and then lost the lateral articulation; in Saaroa, one of the languages most closely related to Tsou, **ñ* is still reflected as /ɬ/. In Malay and other An languages outside Taiwan, palatalisation was a feature preserved only in certain environments (and in most of these languages was independently lost in the environments in which it was retained in Malay — Wolff 1993). Further, **ñ* is reflected as /l/ in certain environments but as [ñ] or [n] in others, at least in the Western An languages

outside of Taiwan. Finally, we note that **ñ* merges with **n* in Bunun and some other languages of Taiwan. In short, the evidence is clear that **ñ* had a palatalised articulation.

On the other hand it is not possible to say that **ñ* was a nasal and not a lateral or vice versa. It clearly has reflexes with a lateral articulation over a wide range of languages, extending minimally as far as western Indonesia. In fact, there are forms found in Eastern Indonesian and Oceanic languages with a lateral reflex in cognates which are derived from a PAn form with **ñ*. However, it is not certain whether or not the forms which evince /l/ as a reflex of PAn **ñ* in eastern Indonesia and in Oceania are in fact directly inherited. They may have been spread secondarily. In any case, the lateral reflex is widespread inside as well as outside of Taiwan. This argues for a hypothesis that **ñ* had lateral allophones. The nasal reflex /n/ is also widely distributed in languages ranging from Taiwan through the Pacific, and this argues that **ñ* had nasal allophones. From an articulatory point of view there is not a great deal of difference between a palatalised [l̡] and a palatalised [ñ]. I conclude that in PAn there were two allophones of **ñ*, both palatalised, one with a lateral articulation and the other with a palatalised articulation, and the distribution may well have been tied to the stress pattern of the root, just as is the case in the western Austronesian languages outside of Taiwan (Wolff 1993).

5 Other articulatory characteristics of the PAn phonology

There are several articulatory characteristics of the PAn phonology which can be deduced from the attested data and which had a role in the development of this phonology to the current time. These processes must have come into play during PAn times because they are found over the entire range of An languages and are still in operation in many of our languages. First is the canonical character of the root as a disyllabic which caused the reformation of monosyllabic roots to disyllabics (see §3 above). It is this factor which enables us to connect disparate forms with similar meanings. A second process is the effect of the stress which caused vowel weakening and syllable loss. PAn did not have any roots greater than three syllables. Reconstructed forms with four or more syllables contain what are clearly petrified affixes (e.g. the prefix **qañi-* found on forms referring to fauna, supernatural beings, etc. and illustrated in the word for 'honey bee' on Chart V below).[4] The general tendency is to transform roots with three syllables into roots with two, but this is a language-by-language process. There are some trisyllabics, which show no or very little syncopation anywhere, nor do they show vowel weakening. There are some which are weakened but not disyllabised; there are some which are disyllabised by loss of the initial vowel in one set of otherwise ungrouped languages and are disyllabised by loss of the medial vowel elsewhere; and there are some which are disyllabised in all languages which reflect them. In this last case a legitimate question may be raised as to why they should be reconstructed as trisyllabics at all — a question to be addressed shortly. The reasons for the differential treatment of the trisyllabics are only partly explained so far. It is a detailed question of the histories of the individual languages which remain to be unravelled. Chart V illustrates these phenomena from a range of languages across the board.

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4 The one exception is the form **qasulipan* 'millipede', which has no recognisable affix. However, it is to be noted that the Bunun reflex treats the root as **qasulip* — Bunun *qapis* 'centipede', as if the **-an* manifested in the reflexes of this etymon in other languages were a suffix.

Chart V: Selected roots of more than three syllables in selected languages

reconstructed meaning	day, sun	night	honey bee	gall	star
PAn form	**qañegaw*	**ɣabii*	**qañiɣuwan*	**qapegu*	**bintuqén*
Paiwan	*qadaw*			*qapedu*	*vitjuqan*
Bunun		*labi-an*		*paqav*	*bintuqan*
Cebuano	*adlaw*	*gabí?i*	*ligwan*	*apdu*	*bitú?un*
Tondano	*edo* 'day'		*nerua*	*peru*	
Manggarai	*leso*	*wié* 'yesterday'		*pesu*	
Bugis	*esso* 'day'	*karawian* 'late afternoon'		*essung*	*wittoeng*
Muna	*ɣoleo* 'day'	*indewi* 'yesterday'	*ka-eniua* 'k.o. bee'	*ɣofei*	
Malay		Toba Batak *robi* 'long ago'	*ñaruan* (Jakarta dialect)	*hampedu*	*bintang*
Ngaju	*andaw*		*ñuan* 'k.o. ant'	*peru*	< Malay
Fijian (Wayan)			*oni* 'k.o. bee'		
Tongan	*?aho* 'day'			*?ahu*	*fetu?u*

In the case of the forms for 'day', 'honey bee' and 'gall' we must conclude that the reflexes derive from forms with three or more syllables, for this is the only good way to connect the illustrated forms with each other. Manggarai and Bugis (and reflexes in many other languages) lose the initial syllable, whereas Ngaju, Tongan, Paiwan, Cebuano, Chamorro and Tondano forms syncopate the medial syllable (and then proceed to make other changes as well). Muna retains the original number of syllables (and in fact adds another syllable in the word for 'bee'). The same is the case for the word for 'gall', except that in the case of this root Paiwan and Malay retain three syllables as does Muna, and the Tondano and Ngaju reflexes lose the initial syllable rather than the medial syllable. Bunun forms a disyllabic root by changing the final **u* to /v/.[5]

It could be argued that the PAn forms were disyllabic and became trisyllabic by vowel epenthesis and then later on reduced. Such a series of changes is certainly possible. However, the form for 'night' and others like it prove that epenthesis is not an explanation for the development of trisyllabic roots. Rather, the trisyllabic roots must have been inherited as such, for in these forms, where a trisyllabic root is retained, the penult is not the reflex of a centralised vowel **e*. Epenthesis would be a possibility if all forms which reflect a medial consonant sequence are cognate with forms which reflect two consonants separated by **e*. But in the form for 'night', for example, languages which reflect three syllables (here Amis, Cebuano, and Tondano) have /i/ in the penult. The most likely conclusion, then, is that the protolanguage had no medial consonant clusters other than sequences of nasal + C (nor for that matter had consonant clusters anywhere within the root). We reconstruct protoforms with a medial **CeC* even in the case of those forms which are reflected only with disyllabic roots having medial consonant clusters. It should be noted that there are few cases of this sort. In most cases in one language or another there is evidence for a vowel separating the medial cluster either by the retention of this vowel or by the fact that the

5 The changes are as follows, beginning with the loss of **-g-*, and they are paralleled in other forms: **qapegu > *qapeu > *paqeu > paqau > paqav*.

process of disyllabisation was accomplished by loss or weakening of the intial syllable in some languages as well as by loss of the medial syllable in others.

In short, there were no consonant clusters within the word. The exception is that stops could be preceded by a homorganic nasal medially. This is illustrated by the word for 'star' in Chart V, which we must reconstruct with a nasal preceding the onset of the penult. The loss of the nasal in reflexes of the word for 'star' in several languages is a function of the distance of the cluster from the stressed final syllable. There was also a process of sporadic inserted nasalisation, but this is attested only in languages outside of Taiwan and may in fact not have been part of the PAn phonological system.

However, there were vowel sequences, as the word for 'night' illustrates. Although Cebuano and Tondano (as well as other languages in the Philippine group) eliminate vowel sequences by inserting a glottal stop in the hiatus between the vowels, Amis shows hiatus. If the word for 'night' had had a **q* before the final syllable, Amis would have reflected this with a glottal stop [ʔ].

Stress in the word was on the penult or on the final syllable. Except for the case of proclitics, there are no examples to my knowledge of the loss of final syllables. If there had been roots of three syllables or more with a strong stress on the antepenult or earlier and no stress on the rest of the root, reflexes manifesting loss of the final syllable would have developed.

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