THE PHONEME SYSTEM AND ITS DISTRIBUTION IN RORO

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In the twenty years that have passed since Dr Arthur Capell published his fundamental work on the linguistic position of South-Eastern Papua the interest in the languages of New Guinea has increased considerably thanks to his inspiring example as a scholar and teacher. This essay is intended as a modest contribution to one particular aspect of the Roro language, or rather one of its dialects.

Roro is spoken by a tribe of the same name living on the coast 65 miles NW of Port Moresby, reaching from Kivori Poe to the village of Hisiu. To the north the Roro have a common border with the Bush Mekeo, to the east with the Mekeo - the southern border is shared with the Nara and Kabadi tribes.

Within the Roro language, which is spoken by 7627 speakers[1], three dialect areas can be distinguished:

1. The Western dialect, often called Waima, is spoken by 3918 persons. Its main characteristics, when compared to the Eastern dialect, are: /h/ for /t/ (nihe *tooth* for Eastern nite) and /t/ for /s/ (tutu *breast* for Eastern susu). Waima is spoken in the villages Aviara-Oreke, Aviara-Waima, Ere Ere, Hauramiri, Hereparu, Hisiu, Keabada (Navuapaka), Kivori-Kui, Kivori-Poe and Roroaira-Waima; they vary in size between 112 and 716 inhabitants.

2. The Eastern dialect, or Roro proper, is spoken by 3309 people. The Roro dialect is spoken in the villages Babiko, Bioto, Delena, Mou, Nikura (Aravure), Pinupaka, Poukama, Rapa and Tsiria. Within this group Yule Island and Delena speak a common subdialect.

3. Bereina, between the Waima and the Roro (dialect) areas, has only 400 speakers, who seem to shift their dialect closer to Roro[2]. In Bereina the Eastern /t/ is assibilated and becomes /tʃ/: Eastern nite ~ Ber. nitʃe.

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The following phonemic analysis is mainly based on the Roro dictionary by P.P. Coluccia. Also a bible translation of the British and Foreign Bible Society was used; its spelling system differs from the dictionary in as much as it shows <v> for <b> and <s> before <i,u>, where the dictionary uses the cluster <ts>. There are also slight variations in the use of <w> and <u>, which will be explained later. Valuable tape recordings of Roro were kindly provided by Mrs Patricia Denham and Mrs Michele Stephen, both of the University of Papua and New Guinea[3].

Based upon the dictionary, which follows the spelling system of the Catholic Mission, the following minimal pairs could be distinguished.

	[para]		para	*to paddle*
[bara]	[βara]	[vara]	bara	*brain*
	[mara]		mara	*torn*
	[tara]		tara	*to stretch out the hand, to get something*
	[nara]		nara	*type of tree* (not known to speaker B)[5]
	[kara]		kara	*to walk on four legs*
	[ʔara]		'ara	*head*
	[#ara-iri]		ara-iri	*to show one's teeth* (unknown to speaker A)[5]
	[hara]		hara	*to cut*
	[rara]		rara	*to warm oneself at a fire*
	[wara][4]		wara	*root of kunai grass (= tsirora)*

On the basis of these minimal pairs, the consonantal phoneme inventory of Roro presents itself as follows:

p	t	k	ʔ
b	–	–	h
m	n	r	#
w			

All these phonemes can be found in initial position before any of the 'pure' vowels /a e i o u/ or before the vowel sequences formed with them as their first part. Before the vowels /i u/ the phoneme /t/ is realized as apical [s] on Yule Island and at Delena, e.g. [aˑsi] or with a slightly palatalized [s'] [aˑs'i] *(= canoe)*; in Babiko, Bioto, Mou and Rapa this word is pronounced [aˑtˢi], i.e. with an assibilated [tˢ], the affricate [ts] or aspirated [tʰ]. The Western dialect of Keabada, Kivori and Waima renders the same word as [aˑhi].

Some minimal pairs:

[tʰatʰa], [tata]		*dry and violent NW wind*
[tʰetʰe]	[tete]	(vulgar term)
[tʰotʰo]	[toto]	*to enter*
[s'is'i],	[tˢitˢi], [tʰitʰi],	*meat, to sing* (children's language)
[s'us'u]	[tˢutˢu] [tʰutʰu]	*teat*

/tata/ and /tete/ were unknown to speaker A.

Aspiration and assibilation seem to be individual variants, as one and the same speaker uses [t, tʰ, tˢ] without any apparent distinction. Speaker B prefers the unaspirated form. [s] (or [h] in Waima) seems to be a combinatory allophone of /t/; the dictionary has in these cases <ts> and the bible <s>. /b/ has the free allophones [b β v].

The phonetic realisation of the consonantal phonemes:

/p/ bilabial voiceless stop, unaspirated or aspirated,

/b/ bilabial voiced fricative [β] or stop [b] or occasionally labiodental fricative [v],

/m/ bilabial voiced nasal,

/t/ apico-dental voiceless stop, unaspirated or aspirated, assibilated or [s] before /i u/,

/n/ apico-dental voiced nasal,

/k/ palato-velar voiceless stop, unaspirated or aspirated,

/ʔ/ glottal stop, sometimes hardly distinguishable from soft onset,

/h/ laryngeal fricative with a strong pharyngeal component,

/r/ slight flap or apical or uvular vibrant, retroflex resonant with one speaker.

The Vowels

For the vowel monophthongs the following minimal pairs proving their phonemic status were found:

[baba baba]	*spongy-soft* (unknown to speaker A)
[bebe]	*to press*
[bibi]	*quail*
[bobo]	*sort of lizard*
[bubu]	*to pick* (not known to speaker B)

Phonemic and phonetic spelling as well as both missions' orthographies coincide for these and all other vowels.

The above minimal pairs justify the establishment of a phonemic triangular vowel system containing three steps

i u

e o

a

The distribution of the vowels

All these vowels also occur in initial position before /p b t n ʔ h r/. The occurrence of post-vocalic /m k/ is subject to the following restrictions, according to the dictionary: There are no examples for e + k (ʔe + k occurs), e + m (ʔe + m occurs), u + k (ʔu + k occurs). The combination of e + m is rare, also in medial position; it was found only in the words kemo (*bamboo*), nemu nemu (*to drizzle*), rema (*abyss*, probably related to raba *ravine*), remo remo (*indigenous flute*). /e/ and /m/ are fairly infrequent phonemes and so the scarcity of /e + m/ combinations does not surprise.

Vowel sequences

Under this heading also the question of vowel quantity shall be dealt with. For the sake of linguistic precision we cannot regard quantity as a suprasegmental feature: Unlike stress or pitch, quantity or vocalic length is not superimposed on the vowel in question or simultaneously produced with it. The term 'suprasegmental' therefore hardly fits a phenomenon by which the duration of a phoneme is altered. This is a phonemic view; phonetically, however, the problem is complicated by the fact that long vowels need not necessarily have the duration of two short vowels; in this sense length can be accepted as a phonetic distinctive feature.

In Roro the following pairs involving vocalic length were found; most of them are not minimal, as length as a phenomenon is rather rare.

[aˈsi], [aˈtsʼi]	åtsi	*pirogue, canoe*
[asi]	atsi	*to whip* (with a stick)
[oˑ]	ô	*yes, I understand* (interjection)
[ʔo ʔo]	'o	*to collect*
[eˑu]	êu	*to turn*
[ʔeu]	eu'	*part, portion*
[ʔeu ʔeu]	eu-eu	*type of small tree*

<atsi, ô, 'o, êu, eu'> were unknown to informant A.

No long [ɾi:][6] and [u:] were found; this may be due to lack of material. As stated above, the classification of [a: e: o:] as separate phonemes in a vocalic triangle with two steps $^{e:}_{a:}{}^{o:}$ would rather be a distributional statement, namely for the occurrence of /aa ee oo/, than an addition to the phonemic system.

The biphonematic evaluation of the numerous Roro diphthongs can be assured without recurring to Trubetzkoy's rule VII which states that no sound in a language should be evaluated as a unit phoneme if it exceeds

the length of other phonemes. The commutation test will suffice to yield the same result:

With substitution of the second vowel:

[ha]	ha	*one*
[hao]	hao	*to push down* (unknown to A)
[hau]	hau	*man, individual*
[hae]	hae	*excrement*
[hai]	hai	*to wrap up* (inf. B), *to cry* (inf. A)
[hea hea]	hea hea	*laplap for 'waho'* (unknown to A)
[hei]	hei	*louse*
[heo heo]	heo heo	*type of bird* (unknown to A)
[reo]	reo	*to resound*
[reu]	reu	*to poke with a stick* (eo and eu are rare)
-	tsia	*definitely, to finish* (unknown to A and B)
[sie]	tsie	*hoopoe of the white cockatoo*
[sio]	tsio	*type of fish*
[siu]	tsiu	*to offer, to reach*
[?o ?o]	'o	*to collect* (unknown to A)
[?oa]	'oa	*to carry at the belt* (unknown to A)
[?oi]	'oi	*to cheat* (unknown to A)
[?ou]	'ou	*enemy*
[poa]	poa	*type of tree* (unknown to B)
[poe]	poe	*beach*
[poi]	poi	*resemble perfectly* (unknown to B)
[pou]	pou	*to carry news; news* (inf. B); *a woven mat* (inf. A)
[pua]	pua	*end*
[pui]	pui	*to cradle a child*
[puo]	puo	*to twist,* e.g. *a string to a rope*

Minimal pairs for [ue] could not be found, probably due to the scarcity of both phonemes involved. The dictionary gave only mue (*to return*) and kue kue (*type of seabird*) as evidence for the /ue/ sequence.

The biphonemic evaluation of the above diphthongs is further evidenced by the following minimal pairs involving a substitution of the first vowel:

[pea pea]	pea pea	*comb of a rooster*
[pia pia]	pia pia	*to walk with a stoop* (unknown to B)
[poa]	poa	*sort of tree* (unknown to B)
[pua]	pua	*end* (unknown to B)

[tae]	tae	*flying fish*
[sie]	tsie	*hoopoe of the white cockatoo*
[toe toe]	toe toe	*to sweat a bit* (unknown to A)
[mue]	mue	*to return*
[ba·i ·], [baẹ]	baî[7]	*puffed up* (unknown to B)
[bai], [ba·i·]	bai	*whitish spot*
[bei]	bei	*water*
[-]	boi	*to pass on the right* (unknown to A and B)
[bui·]	bui	*hair of head*
[bao], [bao:]	baô	*long string on end of which shells are tied; put on canoes*
[bao bao]	bao bao	*phosphorescent* (unknown to A)
[bio]	bio	*cassuary*
[buo]	buo	*because*
[reo]	reo	*to resound*
[rio]	rio	*trap*
[heo heo]	heo heo	*type of kingfisher*
[hao]	hao	*to push down* (unknown to A)
[rau]	rau	*leaves*
[reu]	reu	*to clean* (unknown to A)
[riu riu]	riu riu	*finger*
[-]	rou	*to dry, parch* (unknown to A and B)

The following diphthongs were found: ae ai ao au ea ei eo eu ia ie io iu oa oe oi ou ua ue ui uo.

The commutation test of these minimal pairs clearly shows that all diphthongs must be regarded as sequences of phonemes and phonetically as two vocoid elements which retain their individual identity.

For the treatment of the syllable question, however, a considerable simplification is obtained if all these diphthongs are regarded as monosyllabic.

Even the same words were occasionally pronounced with two syllabic peaks instead of one, and that by the same speaker. Both vowels, however, were in this case never separated by a glottal stop, whose occurrence in intervocalic position is consistent and has a phonemic value.

Bisyllabic peaks were particularly frequent with diphthongs whose initial component was /i/. In initial position both u- and w- occur, e.g. ua (*this, uncle*), 'uai (*first, before*), 'uatsi (*to mean, indicate, promise*), 'uere (*to take a bath*), 'ul (*to fell trees*), wabu (*abandoned*), wana (*to name s.o. after s.th.*), waeha (*dog*), waira (*face*) etc. When ua (*this*) takes the demonstrative suffix -na, it is spelt wana, in dictionary and bible alike. The latter shows prevocalic u- only in

monosyllables. It seems that the distinction between initial [u-] and [w-] is non-phonemic and serves to indicate syllabicity. <ueina> (*but, indeed*) occurs in the dictionary but is unknown to informant A. Informant B, who was also the chief informant for the dictionary, pronounces this word as [vei'ana], the LMS bible translation uses the form <weiana>.

In intervocalic position informant A pronounces <rawa> (*parent-in-law*), <nawa> (*moon*) as [raua, naua], but maintains the distinction between <kaua> [kaua] (*mouse*) and <kawa> [kawa] (*to buy, sell*). Informant B confirmed rawa, mawa (*box*), nawa bawaiana (*to doubt*). Before consonants only [u], <u> occurs: rauko (*crab*), maura (*to abstain from*). The word or morpheme final position is equivalent to the one before consonant (there are no final consonants): <hau-ani> [hau?ani] (*bone-knife*), pou (*rumour*), pou-atsi (*to explode*), tsiu-atsi (*to send to*). The dictionary does not always indicate morpheme boundaries.

Phonotactic rules like CVCV, VCVCV, CVV can be easily dispensed with in Roro. The simplest formulation seems to be that the language does not admit of any consonant clusters.

If to the word and morpheme boundaries is attributed the phonemic value of a consonant, as was done by Weinrich, the prohibition of consonant clusters would explain the lack of final consonants, as it is also reflected in the use of <u> for <w> in morpheme and word final position.

Distribution:

It has been stated above that any consonant can be followed by any vowel and that sequences of any two vowels are found.

In Table 1 a survey is given of the different diphthongs that can follow initial consonants. This chart shows certain distributional limitations that lend themselves to an historical interpretation within the framework of Austronesian. Rare sequences, i.e. those attested by one to three samples - in the chart marked ° - may perhaps in a number of cases turn out to be borrowings, as has often been witnessed in comparative Indoeuropean phonology. The table is self-explanatory and therefore needs no further comment.

In Table 2 a summary of the frequent vowel sequences as found in Table 1 has been given. The figures in the squares indicate how many different consonants can precede that particular diphthong.

Table 3 charts the consonants that can follow initial consonants after the next vowel or diphthong. Initial vowels or diphthongs can be followed by any consonant. Of all these consonant 'sequences' only t-k, h-p, h-k and r-t did not occur at all; p-m, p-h, t-b, t-m, t-n, k-h and b-p are rare. An explanation of these limitations may perhaps

be attempted after more distributional tables have been produced for Protoaustronesian as well as for Melanesian languages.

The Suprasegmentals:

Quantity is not regarded as a suprasegmental feature, as has been explained above.

Pitch is non-phonemic.

Stress: Wordstress is rather weak; vowel reduction was not observed.

Strong[8] maintains that bisyllabic words are stressed on the first syllable. Words with three syllables carry the stress on the first if it contains a diphthong but otherwise on the second syllable. Joindreau's notion that the initial glottal stop of trisyllabic words attracts the stress could not be confirmed from texts or informants. Words like i'nelana and i'rubuna confirm the stress rule by Strong and Joindreau, but, ˌbabe'rona and ˌpero'beta contradict it. Both 'pohama and po'hama, 'sivaha and si'vaha occur.

Joindreau also mentions that bisyllabic verbs have the stress on the preceding verbal particle in the present and future tenses of the indicative, e.g. [ˌ'ke robo, ka'to ao], but the stress in the subjunctive is [tomo 'robo], and in the past tense [a 'ka?a]; informant B, however, stresses to'mo robo.

The function of stress and pitch on the sentence level is outside the scope of this paper.

TABLE 1: Phoneme I followed by phoneme II

P_1 \ P_2	ae	ai	ao	au	ea	ei	eo	eu	ia	ie	io	iu	oa	oe	oi	ou	ua	ue	ui	uo	Σ+
p	+	+	0	+	0	–	–	0	0	–	0	0	0	+	+	+	0	–	0	0	6
β	+	+	+	+	0	+	–	0	0	0	0	–	0	–	0	0	+	0	+	0	7
m	+	+	0	+	0	–	–	–	+	–	0	–	0	–	0	–	0	0	–	–	4
t	+	+	0	+	0	–	–	0	+	0	+	+	0	0	–	0	+	–	0	–	7
n	–	–	+	+	–	–	–	–	–	–	–	0	0	–	0	0	+	–	–	–	3
k	0	+	–	+	–	–	–	–	0	–	0	–	+	0	0	0	–	0	0	–	3
ʔ	+	+	+	+	–	0	–	0	+	–	+	–	+	–	+	+	0	0	0	–	9
-	+	+	+	+	+	–	–	0	+	0	+	0	+	+	0	0	+	0	0	–	10
h	+	+	+	+	0	0	0	–	–	–	–	–	+	0	–	+	+	–	0	–	7
r	0	+	+	+	0	–	0	+	–	0	0	0	0	0	0	0	0	–	0	–	4
Σ+	7	9	6	10	1	1	0	1	4	0	3	1	4	2	2	3	5	0	1	0	60

+ frequent, 0 rare (1-3 samples),- non-existent

TABLE 2: Vowel I + vowel II, frequent combinations

P_1 \ P_2	a	e	i	o	u	Σ
a		7	9	6	10	32
e	1		1	0	1	3
i	4	0		3	1	8
o	4	2	2		3	11
u	5	0	1	0		6
	14	9	13	9	15	60

TABLE 3: First versus second consonant

C_I \ C_{II}	p	β	m	t	n	k	ʔ	h	r	Σ+
p	+	+	0	+	+	+	+	0	+	7
β	0	+	+	+	+	+	+	+	+	8
m	+	+	+	+	+	+	+	+	+	9
t	+	0	0	+	0	–	+	+	+	5
n	+	+	+	+	+	+	+	+	+	9
k	+	+	+	+	+	+	+	0	+	8
ʔ	+	+	+	+	+	+	+	+	+	9
h	–	+	+	+	+	–	+	+	+	7
r	+	+	+	–	+	+	+	+	+	8
	7	8	7	8	8	7	9	7	9	70

NOTES

1. All census figures and data were collected by Mr Andrew Taylor of the Linguistics Department, I.A.S., A.N.U. and Mrs Michele Stephen, Department of History, U.P.N.G., Port Moresby.

2. W.M. Strong, The Roro and Mekeo Languages of British New Guinea. *Zeitschrift für Kolonialsprachen* 4 (1913/14), 285-311.

3. I also wish to thank Mrs Stephen and Mr Taylor for checking the manuscript with native informants.

4. Some speakers have [r], others [ṛ] or [ɾ].

5. Speaker A: George Obara of Chiria village on Yule Island;
   Speaker B: Manu Paul of Delena village.

6. The various forms of baî and bai, all provided by informant A (see Note 7), are rather puzzling to me, and it seems that length is not the only feature involved.

7. Informant A maintains that baî and bai is a minimal pair.

8. W.M. Strong, The Roro and Mekeo languages of British New Guinea, *Zeitschrift für Kolonialsprachen* 4 (1913/14), p. 286. Similar statements are made by E. Joindreau in his Essay on the Grammar of the Roro language. 1907. MS.

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