THE INFLUENCE OF ENGLISH ON A TRIBAL ALPHABET

OR

THE PHONEME OR THE ALLOPHONE?

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0. INTRODUCTION

During 1969 and 1970 psycholinguistic tests were conducted on new literates in the Wahgi community of New Guinea[F.1.] These were run in order to establish the degree of influence which English and Pidgin English were having on the Wahgi semi-literate: whether education in these languages had changed the basic phonemic responses of the Wahgi to his own language, and whether it had introduced new ones. As a result of the tests it was hoped that certain facts would be established from which the most suitable alphabet in which to produce literature for the literate Wahgi speaker could be devised.[F.2.]

Since 1963 my wife and I had been engaged in linguistic and translation work in the Wahgi area, and had produced a number of technical papers about the language. One such paper was the Phoneme paper which described the etic and emic areas of sound in the language, and noted that by a process of contrast and distribution analysis the sum of 23 phonemes had been arrived at. These phonemes consisted of 6 vowels and 17 consonants.

From this basic analysis we developed an alphabet of 23 symbols, and subsequently printed literature in the language using this alphabet. The informants used to assist with this analysis were primarily illiterate, and our attempts to teach them and others to read and write with this alphabet proved successful.

During 1969 certain factors forced our attention to focus on the emerging group of literates arising from the joint effort of administration and mission schools. These were being taught to read and write in English, and also became literate in Pidgin English. A survey of this situation indicated that 3,283 students were daily attending class under the instruction of 98 teachers, see Table 1.

TABLE 1

A detailed list of the schools, students, and teachers in the Wahgi Valley area (i.e. Minj sub-district) as of 1969.

LOCATION	SCHOOLS RUN BY MISSION/ADMINISTRATION		TEACHERS INDIGENE/EUROPEAN		PUPILS
Minj		+	3	1	110
Nondugl		+	5	1	231
Kukmil		+	3	–	138
Kerewil		+	4	–	123
Kimil		+	3	–	100
Tombil		+	1	2	60
Minj	RC		6	3	321
Ambang	RC		7	1	241
Fatima	RC		6	10	479
Milip	RC		2	–	71
Nondugl	RC		4	1	182
Banz	RC		5	3	282
Mondemil	Swiss		3	1	130
Sigmil	Swiss		3	2	196
Kugark	Swiss		1	4	201
Kudjip	Nazarene		2	5	157
Banz	Lutheran		5	–	240
Pukamil	Lutheran		1	–	21
			64	34	3283

From discussions with some of these teachers it was deduced that three to four thousand students had already passed through their schools and were now living in and around the language area. This newly literate section of the society, which we shall estimate to be 7,000 persons, formed therefore an immediate literate public for the literature which we or others might produce.

Nevertheless in presenting our books to members of this literate group we met with disinterest, ridicule, and an inability on their part to read them without real difficulty.

The educated Wahgi's natural desire to improve himself, and his consequent tendency to consider his own language to be inferior to English, was taken into account, but these factors did not explain his difficulty with the alphabet used for his own language.

The problems were restricted to those areas where firstly the Wahgi exhibited two phonemes in an area occupied by only one in English and Pidgin English, for instance: Wahgi has both a dental nasal /n/ and

alveolar nasal /n/, while English and Pidgin English have only the alveolar nasal; Wahgi has both a /k/ phoneme and a velar lateral phoneme /ḷ/, whereas the other languages have only the /k/ phoneme; secondly, where there was not a one to one correspondence between English and Pidgin English and Wahgi phonemes which did occur, for instance English and Pidgin English exhibit the cluster of phonemes /m/ and /b/ in the words 'number' and 'Namba', whereas Wahgi exhibits a corresponding complex phoneme /mb/ in the same area of the word - /embe/ *same*. By definition a complex phoneme consists of two or more segments which in this case act as a unit to the native mind[1] (Pike pp. 128-138). Wahgi has both /m/ and /p/ (p) (b), but no contrast between (p) and (b). The contrast is between /mb/ and /p/. This second point was added to when it was observed that a divergence in the symbolization used for phones which were similar in Wahgi and both in English and Pidgin English caused difficulties. For instance, the phoneme /t/ has both (t) and (r) allophones, but only the symbol 'r' had been used to symbolize it, this was because this was the most frequent allophone. The arbitrary decision to symbolize the phoneme as /t/ rather than as /r/ was made because of the linguist's desire to preserve an appearance of symmetry in the obstruent chart. The new literates reacted against the symbol 'r' when they perceived the phone (t), and preferred to use the symbol 't' in those locations. Thirdly, difficulties were observed where digraphs had been used for phonemes where no suitable single symbol was available.

The following list indicates the respective symbolization chosen for the 23 Wahgi phonemes.

TABLE 2

The first alphabet listed beside the respective phonemes.

PHONEME	ALPHABET SYMBOL	
/mb/	'b'	
/p/	'p'	
/nd/	'd'	
/t/	'r'	
/ŋg/	'g'	
/k/	'k'	
/ndz/	'j'	
/s̱/	's'	
/m/	'm'	
/ṉ/	'ny'	
/n/	'n'	
/ŋ/	'ng'	
/ḷ/	'l'	dental lateral.

TABLE 2 (continued)

PHONEME	ALPHABET SYMBOL	
/l/	'l'	medially,
	'lt'	in final position. Alveolar lateral.
/ḷ/	'll'	velar lateral.
/w/	'w'	
/y/	'y'	
/i/	'ii'	
/ɪ/	'i'	(I) is equivalent to Pike (ɪ).
/e/	'e'	
/a/	'a'	
/u/	'u'	
/o/	'o'	

This list indicates that prenasalized obstruents were being treated as complex phonemes, and that the Wahgi was expected to respond to 'b', 'd', 'g' and 'j' by uttering a prenasalized obstruent of the correct phonic quality according to its distribution. By use of the symbol 'r' we indicated that we expected the Wahgi to utter a (t) in response to this symbol when the distribution of the phoneme determined it and to utter (ř), (R̃) and (ř) respectively. Accordingly the Wahgi was expected to respond to the digraphs 'ny', 'll', and 'ii' and 'ng' but uttering a single phone.

These expectations were realized when we were able to instruct illiterates and some literates in actual literacy classes, but the uninfluenced literate section of the community responded in a way other than as we had expected them to.

Research therefore, was centred in those areas which have greatest concern. These areas are entitled as follows:

A. Low Function Contrasts - in general covering those areas where Wahgi has two phonemes to the single English phoneme;

B. Diverse Symbolization of one Phoneme - this area deals with the lack of isomorphic correspondence of phonemes between the languages, and the awareness of the allophone;

C. Digraphical Symbolization.

1. LOW FUNCTION CONTRASTS

Contracts between /i/ and /ɪ/, /n̲/ and /n/, /ɭ/ and /k/.

The Trubetzkoy-Bloomfield contrast-distribution type of analysis used to resolve the phonemes of the Wahgi language was a reasonably systematic and rigid method, but it gave little opportunity for a study of the functional load which the phonemic contrasts carried. For instance it is possible to establish by minimal word pairs that a phonemic contrast exists between /i/ and /ɪ/ (see list of minimal word pairs which follows - Table 3), but these same pairs show that for the most part the words used in the contrast come from different word classes. This being so it means that these words would very seldom occur in identical environments in conversation.

The concept of the phoneme is based on the principle that it is a functional unit within the system of a language. Consequently it must function on the paradigmatic axis at the utterance level, and not simply as a phonic segment which might be contrasted with another phonic segment if the contexts in which they occur are isolated and reduced to word level. If one reduces the contexts in this way one changes a syntagmatic relationship into a paradigmatic one, or makes a function which is relevant to the Process, relevant to the System.[2] (Dinneen p. 337). For instance the words used to establish the /i/ and /ɪ/ contrast might also stand syntagmatically related to each other:

/ka kip kɪp enɪm/	*The hawk is charred.*
bird hawk charred	
/ka kip pu ka mɪm mim/	*The hawk is in the nest.*
bird hawk go bird nest is	
/elɪm n̲ɪm n̲im/	*He spoke to you.*
he you spoke	

By ignoring the contexts and merely comparing these words on the word level we can contrast the segments paradigmatically. But in actual language context this is almost impossible. This might also be applied to the other phonemes in question in this section.

TABLE 3

A list of minimal pairs which were used to establish the phonemic contrast between certain phonemes which has later been considered to be a low function contrast.

PHONEME	MINIMAL PAIR	TRANSLATION	WORD CLASS
/i/	/nim/	*he spoke before*	Verb
/ɪ/	/nɪm/	*you*	Pronoun
/i/	/kip/	*hawk*	Noun
/ɪ/	/kɪp/	*charred*	Verb specifier
/i/	/mim/	*he is*	Verb
/ɪ/	/mɪm/	*nest*	Noun
/i/	/sim/	*it is*	Verb (used of inanimate subjects)
/ɪ/	/sɪm/	*he took*	Verb (used with animate subjects)
/i/	/pim/	*he knew before*	Verb
/ɪ/	/pɪm/	*he knew*	Verb
/i/	/nim/	*he spoke before*	Verb
/ɪ/	/nɪm/	*he spoke*	Verb
/n̠/	/kon̠e/	*hungry*	Verb Specifier
/n/	/kone/	*rain*	Noun
/n̠/	/kon̠/	*cheek*	Noun
/n/	/kon/	*bag*	Noun
/n̠/	/en̠e/	*sun*	Noun
/n/	/ene/	*he works*	Verb
/n̠/	/en̠ɪm/	*you all*	Pronoun
/n/	/enɪm/	*they worked*	Verb
/n̠/	/kan̠ɪm/	*he sees*	Verb
/n/	/kanɪm/	*they see*	Verb
/k/	/aka/	*sweet potato*	Noun
/ḷ/	/aḷa/	*mistake*	Verb specifier
/k/	/kek/	*scare*	Verb specifier
/ḷ/	/keḷ/	*send*	Verb
/k/	/nok/	*cold*	Verb specifier
/ḷ/	/noḷ/	*water*	Noun
/k/	/mbok/	*fall* (of animate subjects)	Verb specifier
/ḷ/	/mboḷ/	*ripe* (of inanimate subjects)	Verb specifier

These are all the minimal pairs discovered in the language to date which contrast the phonemes in question.

The psycholinguistic tests indicated that on the one hand when contrastive symbolization was used to represent these phonemes (/i/ and /ɪ/, /n̲/ and /n/, /k/ and /ḳ/) there was no consistency of response by the Wahgi to that symbolization, but rather that the Wahgi was confused in his response, for instance he would write either 'niim' or 'nim' for (nim). On the other hand no ambiguity was experienced when contrastive symbolization was not used, for instance, when only 'nim' was used for both /nim/ and /nɪm/ he responded correctly according to context. The following statistics taken from Section 7 illustrate these points:

When /n̲/ was symbolized as 'ny' and as 'n' the following percentages in the Flash Card tests (see section 7.1.) were recorded.

FLASH CARD TESTS	WORD INITIAL	WORD MEDIAL	WORD FINAL
as 'ny'	17/27	23/27	13/24
as 'n'	63/63	63/63	62/63

NOTE: 17/27 means - 17 correct occurrences out of 27 occurrences.

The dictation tests indicated that the students used no contrastive symbolization to distinguish /n̲/ and /n/, while the Reading tests revealed that when /n̲/ was symbolized as 'ny' and 'n' the following statistics occurred:

READING TESTS	WORD INITIAL	WORD MEDIAL	WORD FINAL
as 'ny'	21/26	13/20	14/60
as 'n'	100%	100%	100%

These statistics reveal that the symbol 'ny' is unsuitable for reasons which I will discuss under Problem area C, Section 4, but they also indicate that the symbol 'n' is fully acceptable when it is used to symbolize /n/.

Following are the statistics for both /i/ and /ɪ/, and /ḳ/ and /k/.

FLASH CARD TESTS	WORD MEDIAL	WORD FINAL
/i/ as 'i'	62/72	45/45
as 'ii'	24/30	25/27
/ḳ/ as 'k'	65/68	55/57
as 'k̲'	11/11	11/11
as 'ǩ'	3/3	3/3
/k/ as 'k'	No actual test but observations indicate 100% acceptance.	

DICTATION TEST	WORD MEDIAL	WORD FINAL
/ḷ/ written as 'k'	44 times	84 times
written as 'g'	36 times	3 times
/i/ written as 'i'	47 times	53 times
written as 'ii'	1 time	7 times

READING TESTS	WORD MEDIAL	WORD FINAL
/i/ as 'ii'	92/97	38/46
as 'i'	184/204	141/165

NOTE: with respect to Reading Tests the figure 92/97 means 92 correct responses out of 97 responses, etc.

/ḷ/ - as the results of these tests for /ḷ/ are too numerous to add here, the reader is referred to Section 7.3. "Results of the Reading Tests" to view the statistics and symbols used.

As a result of these statistics it is postulated that some phonemic contrasts within the language carry a low function load, while others carry a high function load. Those carrying the low function load may be established only at the word level, and only at that level by comparing words of diverse word classes. Albeit, a few cases might be observed at a higher level, that is within the same Word Classes. The members of these contrasts, therefore, are not established phonemes in the light of the present synchronic stage of the analysis, but might represent a diachronic metamorphosis: a phonemic contrast developing in the language, or one which is fading away. To support this argument it is noted that /n̲/ and /ŋ/ are used in a mutually exclusive distribution in the following way:

/n̲/ before /i/, /ɪ/ and /e/ in word initial position.

/ŋ/ before /a/, /u/ and /o/ in word initial position.

/n̲/ before /ɪ/ and /e/ in word medial position.

/ŋ/ before /ɪ/, /e/, /a/, /u/ and /o/ word medially.

Likewise the vowels /i/ and /ɪ/ are used in a partial mutually exclusive distribution:

/i/ occurs in word medial and final position.

/ɪ/ occurs only in word medial position.

Further to this, these two vowels are used interchangeably in certain words:

Either (sinambiḷe) or (sɪnambiḷe) *They both took.*

Either (ninambiḷe) or (nɪnambiḷe) *They both spoke.*

The consonants /k/ and /!/ are also used in a partially mutual exclusive distribution:

>/k/ in all word positions.

>/!/ only in word medial and final positions.

The conclusion which may be drawn from these facts, therefore is that the contrast between these phones has not been conclusively proven, and that contrastive symbolization in the orthography is not required.

It is felt that the Prague and Bloomfieldian type of analysis used to arrive at the original phonemes of Wahgi, and consequently their symbolization in the orthography, by not taking note of degrees of function, as described here, and the relevance of minimal pairs from within a word class, tends to ferret out all the phonic contrasts establishable within the language, and consequently to overload the language with signalling entities. Context, as noted by Martinet (Martinet p. 266) and (Lions pp. 81-84)[3], must play an important part in establishing the status of contrasts. To simplify the task of searching for parallel contrasts I suggest the following two procedures: firstly and primarily that minimal word pairs used in establishing a phonemic contrast be required to come from the same word class; and secondly that 12 to 20 such pairs at least, be sought to prove the status of the contrast.

Two further points concerning these entities must be considered before this part of the discussion is complete: first of all whether these segments constitute different phonemes or allophones of the same phoneme; and secondly the influence of the national languages on the final decision as to their status in the orthography.

Since the contrasts occurring between these pairs of phones have been shown to be of low functional value within the system of the language, can they be considered to be allophones of the same phoneme? Such an allophonic relationship can not properly be established on the word level, for minimal contrasts of words devoid of their linguistic context can establish them as phonemes. But on the phrase and the clause level, of phonological analysis, a detailed description of the contexts in which these entities occur would establish that they never occur in identical environments, that is except for the contrast established between (i) and (ı) between two verbs, one indicating the Completive Aspect, the other the Absolute Completive Aspect. But even in these cases certain Temporal Phrases co-occurring in the text would prove the context to be less than minimal. Further, these forms of the Verb, in these Aspects, are often used interchangeably that is -

either /yek nɪm/   or /yek nɪm/   *he spoke*
    before he spoke   *before he spoke*

This serves to support the point being made here, that the value of the contrast is of a secondary nature.

The tonal analysis of Wahgi supports this contention. But for the occurrence of one pair of multisyllabic verbs which have identical tone patterns, it would be possible to say that /ɪ/ occurs with the low toneme, and /i/ never with a low toneme.

The second point discussed here must have a strong bearing on the consideration of these entities from a sociolinguistic standing. Luzbetak recognized the need for a modified alphabet when one considered the growing number of Pidgin English and English speakers of the area. Statements by Don Laycock, Stephen Wurm, and Geoffrey Smith supporting the argument that Pidgin English will develop into the national language of New Guinea, and pointing out that when there is government recognition of such development it 'could mean education in Pidgin in primary schools, (and) expansion of literacy in Pidgin...'[4], demonstrate the importance of national tongues and future development. If it is possible to predict diachronic developments within languages, and in particular in Wahgi, although I am not propounding that such predictions are possible, then because of the prestige of the national tongue it would seem possible that change would be in favour of the national tongue, rather than away from it. Such changes in the vocabulary of the language are occurring continuously, but they have also been noticed to be occurring in the phonology of the language. For instance the lack of consonant clusters in word initial position is now under attack. Such words as 'store' and 'stone' have been assimilated into the language as vocabulary items, but whereas members of the older generation pronounce them as (sɪto) and (sɪton), some members of the younger generation are able to say (sto) and (ston). Other developments might be quoted.

Where, therefore, the status of certain segments which might be interpreted as either different phonemes or allophones of the one phoneme is open to question, and those segments if interpreted as phonemes would mean two phonemes in areas where the national tongue has only one, it would seem wise and practical to interpret them as allophones.

Under Research Area A, Low Function Contrasts, I have attempted to show how the method of analysis used to arrive at the phonemes of the language was unable to indicate the degree of function a phonemic contrast carried in this language. Under Research B, Diverse Symbolization of One Phoneme, I discuss how that method also failed to indicate

the degree of response which the informant might have to a phoneme in different areas of the word.

2. RESEARCH AREA B

The previous method of analysis used to discover the phonemes ruled that should the consonant cluster (mb) occur in word initial, medial, and final positions, but that that language only exhibits nonsuspect clusters (According to Pike, phonic clusters such as (ph), (ts), (mb), (tw), (?y) are suspect of being either one or more phonemes, but that clusters such as (km), (nb), (st) etc. are clearly a cluster of two consonant phonemes.) (Pike p. 131)[5] in word medial and or final positions, then on the basis of (mb) occurring in a word position where no nonsuspect cluster occurs, the cluster should be interpreted as a complex phoneme throughout the word. Wahgi has nonsuspect consonant clusters in word medial position, but not in word initial and final positions.

The word, (koɬs) *star* with the word final consonant cluster (ɬs) does occur, and may prove to be a consonant cluster of the nonsuspect type, but because the segments are homoganic, and fricativized, and (s̲) may be considered as an off glide of (ɬ), it is here interpreted as a complex segment, an allophone of the dental lateral (l). The alveolar lateral flap phoneme /l/ allophone (ɬt̬ʰ) is described as an alveolar lateral retroflex flap, with voiceless alveolar aspirated stop release, and is interpreted as a complex segment. It occurs in word final position. (beɬt̬ʰ) *read*.

Nonsuspect Clusters: moɬmŋe (moɬ̣mŋe) *They remain......*

Suspect consonant clusters occur in all three word positions:

Suspect Clusters:	(mba)	*but*	(ŋga)	*name*
	(embe)	*same*	(ens̲ɪn)	*hair*
	(ampʰ)	*woman*	(ontʰ)	*tree*

and unprenasalized clusters such as:

(t̲s̲ɪmpʰ)	*leg*	(kats̲ɪm)	*waste*
(kʷon)	*bag*	(geɫt̬ʰ)	*read*

Therefore the correct interpretation of the suspect clusters, according to the theory of structural pressure used, was to interpret the consonants of these clusters as acting as one complex phoneme wherever they occurred.

The Psycholinguistic tests (see Section 7) indicated that in word initial position the informants responded to the complex phonemes: /mb/, /ndz/, /nd/, and /ŋg/ as one unit of sound, that is as complex phonemes, but that in word medial and final positions he was able to perceive up to two articulated segments.

In word initial position (mb) was heard as (ᵐb) or even as (b), but elsewhere in the word it was perceived as two segments (m) and (b), or (m) and (p), as were also the other complex phonemes.

When orthographical symbolization was used to symbolize both prenasalization and the obstruent segment in word initial position, the result was that the informant demonstrated his inability to pronounce the complex phoneme correctly. With such words as /mba/ *but,* and /ndop/ *fire* symbolized as 'mba' and 'ndop', the informant inserted a vowel between the nasal and the obstruent and pronounced (maba) and (nadopʰ). On the other hand when such words as these were symbolized as 'ba' and 'dop' there was a high degree of accurate response, the informant pronouncing such words as (mba) and (ndopʰ).

The following statistics, taken from Section 7, support these facts:

Complex Phonemes in word initial position. (See Section 5, for a description of the tests).

FLASH CARD TESTS			DICTATION TESTS	READING TESTS
Symbol used				
/ndz/	j	42/42	used 103 times	103/110
	ns	6/42	not used	zero response
	nj	10/38	not used	2 correct responses
/mb/	b	77/81	used 61 times	134/142
	mp	6/42	not used	2 correct responses
	mb	11/42	used 2 times	2 correct responses
/nd/	d	9/9	used 123 times	44/46
	nd	21/42	used once	2 correct responses
	nt	9/42	not used	not tested

/ŋg/ This phoneme was not tested, and its interpretation is therefore based on the other prenasalized complex phonemes.

In word medial and final positions the informant showed a marked preference for symbolization which represented both the prenasalization and the obstruent, and also a symbolization which indicated that the obstruent was voiced in both of these positions.

Statistics for these Phonemes in Medial position:

FLASH CARD TESTS			DICTATION TESTS	READING TESTS
/ndz/	j	53/54	used 10 times	153/166
	ns	27/28	used 8 times	151/160
	nj	60/63	used 91 times	92/114
			other clusters used 35 times	
/mb/	b	37/45	used 15 times	163/204
	mp	42/42	used 6 times	6 correct responses
	mb	43/45	used 74 times	86/105
/nd/	d	45/45	used 8 times	36/39
	nt	42/42	used 10 times	9 correct responses
	nd	45/45	used 100 times	166/176

Statistics for these phonemes in Final position:

FLASH CARD TESTS			DICTATION TESTS	READING TESTS
Symbol used				
/ndz/	j	53/89	used 6 times	46/103
	ns	44/47	used 108 times	131/167
	nj	42/47	used 245 times	77/95
/mb/	b	34/45	not used	175/237
	mp	26/27	used 96 times	66/77
	mb	26/29	used 211 times	81/93
/nd/	d	29/45	used 10 times	13/19
	nt	34/39	used 73 times	16/20
	nd	39/42	used 358 times	no test

From this evidence it can be concluded that the informant preferred a single unprenasalized symbol in word initial position, and a prenasalised symbol consisting of two segments in word medial and final positions. It can further be concluded that he showed a preference for a voiced obstruent symbol in all three positions.

The following diagram uses the phonemes /mb/ as an example of all the prenasalized Wahgi phonemes, and compares the preferred symbolization evidenced in the tests with that used both in English and Pidgin English:

Phoneme /mb/: allophones-word initial (mb) medial (mb) final (mp^h)
positions

Preferred symbolization:	b	mb	mb
English language symbols:	b	mb/mp	mb/mp
Pidgin English symbols:	b	mb/mp	/m

The question arises therefore as to whether the varied response of
the literate Wahgi to the complex phonemes is also indicative of the
illiterate informant's response, or whether the new influence of English
and Pidgin English, as taught in the schools to the literate Wahgis,
has developed new phonemic responses, so that now the literate Wahgis
can perceive, in certain areas of the word, the several segments of the
complex phonemes?

Arguing in favour that these responses also represent those of the
illiterate Wahgi I would note that English does have word initial
consonant clusters, as found in the words *tree, spy, crime, brew,* etc.,
but this pattern has not influenced the literate Wahgi into perceiving
both segments of Wahgi complex phonemes in word initial position. Added
to this is the point that when the literate Wahgi pronounces such
English words as *store,* and *stone,* he tends to give them the Wahgi
pronunciation of the Pidgin English words *ston* and *sto,* that is by
inserting a vowel between the 's' and the 't': (sɪto)(sɪton).

If my conclusions are correct, and the literate's responses also
indicate the illiterate's responses, and are not those of subjects
merely influenced by English and Pidgin English, then it may be said
that the procedures used to arrive at the original interpretation of
the complex phonemes are insufficient, and fail to indicate the speaker's
perception of the phoneme as it occurs in diverse parts of the word.

Hjelmslev insisted that only paradigmatic relationships be regarded
in discovering the relevant relations in a system[6]. (Hjelmslev p.74,
Dinneen p. 337). These tests give support to this argument. In order
to assert that phonetically similar phones are allophones of the one
phoneme, although they occur in different areas of the word, is to
state an arbitrary assumption which may result in correct, but sometimes,
also incorrect results.

This whole question is important for the following reasons: the
original orthography chosen for the language represented the complex
phonemes with the obstruent segment of the cluster: /mb/ was symbolized
as 'b' in all its distribution etc. The result was only partial failure
in obtaining fluency in reading: that is some students read 'b' as (b)
and (p), rather than as (mb) and (mp). If the symbol 'mb' had been used
in all word positions the tests indicate that the texts produced would

have been completely unintelligible to the people because of such symbols occurring in word initial position.

If, on the other hand, English and Pidgin English have developed new phonemic responses in the literate Wahgi, then wherever indigenes are being educated in these languages, such psycholinguistic testing procedures as indicated in this paper, should play a major role in determining new alphabets for the indigenous language of those areas, or in modifying the old alphabets.

Referring once again to the paradigmatic and syntagmatic axes within the system of language the following assertions are noted. The evidence presented here suggests that only the paradigmatic relationship is reliable for establishing what is and what is not a phonemic contrast, that is, what is the mentalistic response of the indigenous speaker to the phones of his language, or putting it another way, what are the ideal phones used by the speaker to indicate the sound-image in his mind.

Taking /mb/ once again as a representative of the complex phonemes, it is evident from the tests, that the Wahgi perceives this phoneme in two ways: initially as (^{m}b), elsewhere as (m) and (b). The phonological description of Wahgi; (Phillips p. 22)[7] indicates that in word initial position (mb) and (mp) occur, in word medial position both occur again, while in word final position (mp^h), and (mp) (mpɜ) occur. Therefore the Wahgi's perception of this phoneme is not an accurate or even near accurate phonic portrayal.

The general Trubetzkoy approach to establishing phonemes necessitates that contrasts must be capable of producing intellectual distinctions, and that where no such contrasts can be established the phonically similar forms be treated as either facultative phonic variants, or combinatory variants. (Trub. Intro. pp. 7-10)[8]. Consequently the paradigmatically phonetically similar phones, referred to above, would be interpreted as facultative variants, while the syntagmatically phonetically similar phones would be seen as combinatory variants.

This procedure includes the syntagmatic axis which Hjelmslev later rejected, and which the psycholinguistic tests applied to subjects in the Wahgi language have shown to be insufficient for interpreting certain phonic material.

The following questions must be answered: if the data collected represents the subconscious phonemic (by this I mean - the psychological reality to the speaker) responses of the Wahgi to the phonic substance of his language, then does he in fact have two prenasalised bilabial stop phonemes, irrespective of whether these two phonetically related

units are contrastable or not? secondly: if this interpretation of
the facts is incorrect, does the Wahgi have a single phoneme of this
type in his subconsciousness, or at the form level of his language,
but that this form entity, /mb/, having the phonic distribution described
above, is responded to at the allophone level rather than at the phoneme
level, or at the diallophone level? (Hammarstrom p, 12)[9] defines phones
as 'the smallest, or shortest, segments which are produced by the
speaker, single or in sequences, to contribute to forming spoken words
(or lexes) and which the hearer identifies, among other things, when he
understands a word (a lex).' He defines allophones in the following
way: 'Phones having definite relevant "positions", or, said in
another way, a definite distribution, and differing among themselves
only through free (point 2 above) and facultative (point 3-5 above)
variation form a set called allophones.'

Applying these definitions to the discussion in hand it is noted
that /mb/ has allophones as follows: word initially (mb) (mp), medially
(mb) (mp), finally (mp^h) (mpə) (mp) (the presence of (mp) is doubted by
myself, but has been heard by other linguists. Stratifying the
relations within the allophones it is noted that word initially the
allophone (^{m}b) is exhibited by the diallophones (mb) (mp), word medially
the allophone (mb) is exhibited by the diallophones (mp) (mb), word
finally the allophone (mp^h) is exhibited by the diallophones (mp^h)
(mpə) (mp). Further descriptions of the genetic, gennemic, and energemic
aspects of these phones would reveal other stratas such as triallophones
and tetrallophones etc. (Hammarstrom p. 6)[10], from such data it would
be possible to establish that the allophone (^{m}b) differs from the
allophone (mb) by onset features, by degrees of length over the sequence,
and by emphasis given to each segment of the sequence.

If the Wahgi is responding to the phoneme at the noncontrastable
allophonic level, then the orthographic representation of the phonemes
should also symbolize this level and not that of the phoneme level.

Statistics from the tests have already been quoted to substantiate
this line of argument with respect to the prenasalized obstruents, but
the following statistics indicate that this is the case also with the
phonemes /t/ and /l/.

Statistics for the phoneme /l/, as it occurs in medial position.

Symbol used	FLASH CARD TESTS		DICTATION TESTS		READING TESTS	
	Sth	Nth	Sth	Nth	Sth	Nth
/l/ l	99/106	7/9	used 123	used 10		
l t	19/45	3/3	used 6	not used	Ø	3 correct
l d	13/24	–	used 23	not used	44/73	10/17
l r	8/19	0/6			25/53	6/24
l l	22/22	5/6				
r			used 3	not used		

Statistics for the phoneme /l/ as it occurs in final position.

Symbol used	FLASH CARD TESTS		DICTATION TESTS		READING TESTS	
	Sth	Nth	Sth	Nth	Sth	Nth
/l/ l	3/22	1/6	used 26	used 3		
l t	63/68	5/6	used 12	used 2	13/17	–
l d	45/59	5/9	used 18	not used	3/5	–
l r	27/56	1/6	not used	not used	9/13	–
l l	12/19	4/5	not used	not used		
other digraphs used			9 times	not used		

Statistics for the phoneme /t/ in word initial position.

Symbol used	FLASH CARD TESTS	DICTATION TESTS	READING TESTS
/t/ r	not tested	4/14	14/78
t	not tested	10/14	100% correct

Statistics for the phoneme /t/ in word medial position.

Symbol used	FLASH CARD TESTS	DICTATION TESTS	READING TESTS
/t/ t	not tested	12/14 after na-	after C 100% correct
r	not tested	2/14 after na-	100% correct except after na-, then 10/20

An over-all summation of the tests demonstrates that the literate Wahgi perceives the alveolar lateral flap /l/ phoneme as a single segment in word medial position, and as two segments in word final position. They also indicate that for the phoneme /t/ the Wahgi perceives 't' in word initial position, and word medially after the negative prefix na-, and as the second member of a cluster (see Section 7), but word medially elsewhere and word finally as 'r'. In other words the Wahgi is responding to allophonic differences.

The phonological description describes the alveolar lateral flap phoneme /l/ as having seven phonic variants. These are subgrouped into allophones and diallophones in the following way: the allophone (ɫ̌) occurs in word medial position and has the diallophones (ɫ)(ɫ̌) (ɫ̌); the allophone (ɫ̌tʰ) occurs in word final position and has the diallophones (ɫ̌tʰ) (ɫ̌tR̃) (ɫ̌R̃) (ɫ̌d).

The phonological description further describes the phoneme /t/ as having seven phonic variants. These are subgrouped into allophones and diallophones in the following way: the allophone (t)with the diallophones (t)(d)(t) and (tʷ); the allophone (ř) with the diallophones (r̃) (ř) (R̃). (See phonological description p. 9 for details of distribution of these diallophones.) The diallophones attributed to the allophone (ř) might be redistributed accordingly: the allophone (ř) having diallophones (ř) (r̃); the allophone (R̃) having the diallophones (R̃) (r̃).

The following list of allophones of all prenasalized obstruents and the phonemes /l/ and /t/, together with the preferred symbolisation preferred by the Wahgi as indicated in the tests, reveal an extremely close association of allophone and symbol.

Diagram of certain Phonemes with allophones, and the Preferred Symbolization indicated as a result of the tests:

PHONEME	ALLOPHONES			SYMBOLISATION		
	ini	med	fin	ini	med	fin
/mb/	(ᵐb)	(mb)	(mpʰ)	b	mb	mb
/nd/	(ⁿd)	(nd)	(ntʰ)	d	nd	nd
/ndz/	(ⁿdz)	(ndz)	(ns)	j	nj	nj
/ŋg/	(ŋg)			g		
/l/		(ɫ̌)	(ɫ̌tʰ)		l	lt
/t/	(t)	(ř) (t)	(R̃)	t	r/t	r

The preceding line of argument substantiates the hypothesis put forward here concerning the Wahgi's unconscious response more to the allophonic level than to the phonemic level with respect to certain phonemes, but the force of the argument is limited to word initial and word medial positions for prenasalised obstruents. It does not really answer why the Wahgi prefers the above voiced indicating symbolisation for allophones which are voiceless in character in word final position. The statistics quoted previously (pp. 41 - 42) supporting the above preferred symbolisation for prenasalized obstruents demonstrates that the Flash Card Tests revealed that the Wahgi would respond to either the voiced or voiceless indicating symbols, in word final position, for instance, either 'mb' or 'mp'. The Reading Tests revealed a similar result. But the Dictation Test, in which a far greater number of students were tested, revealed a definite preference for the voiced indicating symbolization, for instance 'mb' in this final position. There is no ready answer to this problem.[F.3].

The equivalent phonetic cluster in English is both phonetically voiceless and alsohas symbolization indicating the same; the English word *plump* (plʌmp[h]). The English symbols 'mb' occurring in word final position have the phonetic equivalent of (m), as seen in the word *plumb*. The phonetic segments (mp[h]) do not occur in Pidgin English in word final position, only the segment (m). It can be concluded there-fore that neither English nor Pidgin English are exerting influence on the Wahgi's choice of symbolisation in this case.

Basing my thoughts on the preferred symbolization for the prenasalized obstruents as demonstrated throughout the tests, I would put forward the following hypothesis: the Wahgi is responding to the allophonic level of Wahgi phonology, but he shows a conclusive bias for perceiving just two of the three or more possible allophones attributable to a phoneme. One of these allophones occurs word initially, the other word medially and finally.

3. C. DIGRAPHICAL SYMBOLIZATION

The digraph as an alternate form of symbolization in the place of a single symbol was turned to whenever a single symbol was not available. For instance Wahgi evidently had two phonemes in the high frontal region: /i/ and /ɪ/; two nasal phonemes in the dental alveolar region: /n̲/ and /n/. The symbol 'i' was used to indicate /ɪ/, while the symbol 'ii' was used to indicate /i/. The digraph was used for /i/ firstly because its occurrence in word final position often was stressed and therefore nonphonemically lengthened ('mi:')*I am*; secondly because

English often used a double symbol to represent the same sound: 'ee' as used in the word *feet*, 'ea' as used in the word *beat*, etc. The symbolization 'ee' was considered, but rejected because Wahgi both exhibited such a cluster, as in the word se-ee *place*, and also because of the basic phonic correspondence signalled by symbols in the Wahgi alphabet. The symbol 'n' was used to indicate the alveolar /n/, while the digraph 'ny' was used to symbolize /n̪/. Initially the symbol 'ñ' was suggested for /n̪/ but rejected because of printing difficulties. 'ny' was chosen because the dentalization of the nasal tended to give to the segment a palatalized auditory appearance, such as indicated by the symbol 'y'. It was also chosen because it would facilitate easier typing on the average typewriter.

The occurrence of three lateral phonemes in the Southern dialect caused acute problems in the choice of suitable alphabetical symbols. The auditory properties of the dental lateral most closely approximated those of the English alveolar lateral, so the dental lateral was symbolized by the 'l' plus 't^h', consequently the symbol 'lt' was used. The velar lateral was the most difficult phoneme to symbolize. Because this phoneme had the allophone (kⱡ), the 'kl' symbol was the first symbolization used, but this was later rejected when evidence demonstrated a dialectical overlap between the Northern alveolar lateral flap phoneme, and the Southern velar lateral fricative. Principles and procedures by which I worked necessitated that the alphabet, if possible, be made suitable for the entire language. The advantages of this approach: such as one printing all literature; the unifying effect of such an alphabet, etc. are self evident. Consequently a neutral symbol, the symbol 'll' was chosen. This symbol was already in use in English: in the word *tell* (although there was no correspondence between the phonic properties indicated in the two languages); and Luzbetak had suggested the symbol in a previous work (Luzbetak p. 13)[11]. My first impressions were that it was a suitably neutral symbol which might bridge the gap between the two dialects.

The digraph 'ng' was chosen for the velar nasal /ŋ/ because English used this symbol for an identical phoneme: in the word *sing*.

The following diagram demonstrates certain preferences of the Wahgi for symbols as revealed in the various tests, to symbolize phonemes which had previously been symbolized by digraphs.

SYMBOLS CHOSEN BY THE WAHGI FOR PHONEMES WHICH HAD PREVIOUSLY BEEN SYMBOLIZED WITH DIGRAPHS

PHONEME	SYMBOL	FLASH CARD			READING			DICTATION		
		ini	med	fin	ini	med	fin	ini	med	fin
/i/	i	not occur	62/72	45/45		184/204	141/165		47/70	53/74
	ii	not occur	24/30	25/27		92/97	38/46		1/70	7/74
	e								22/70	8/74
/n̲/	n	63/63	63/63	62/63	100%	100%	100%	100%	100%	100%
	ny	17/27	23/27	13/24	18/23	13/20	14/60	no occurrence		
/ŋ/	ng				5/100	15/100	5/100	6/31	2/5	2/5
	n							25/31	3/5	3/5

PHONEME	SYMBOL	FLASH CARD				READING				DICTATION	
		Sth		Nth		Sth		Nth		Sth	
		med	fin	med	fin	med	fin	med	fin	med	fin
/ḷ/	ll	0/11	3/33	3/3	8/9	0/50	5/60/				
	kl	2/33	9/19	1/3	zero						
	gl	5/11	4/11	0/3	0/3	13/19	13/44	8/26	9/15		
	k	65/68	55/57	0/12	0/9	80/81	168/168	zero	zero	44/81	84/100
	c					50/56	118/120				
	k̲	11/11	11/11	0/3	0/3						
	l̲					33/37	37/120	zero	36/36		
	g					30/45	145/168			38/81	3/100
	ł	7/11	20/33	3/3	8/9	23/34	89/121	43/45	135/136		
/l/	l	99/106	3/22	7/9	1/6					123/156	26/135
	lt	19/45	62/68	3/3	5/6	13/17				6/156	22/135
	ll	22/22	12/19	5/6	4/5						
	r										44/135
	digraph										39/135

These statistics show that the symbol 'i' is preferred in all tests
for the phoneme /i/, but that recognition of the digraph 'ii' as the
phoneme /i/ is not out of the question. My experience in literacy work
in the language, however, indicated that there was a low degree of
consistency in the use of 'ii' in writing, and in its recognition in
texts. The Reading figure for 'i' 47/70 and 53/74 is accounted for by
dialect differences. This also accounts for the high occurrence of
'e' 22/70.

The new literates had little alternative but to write the symbol 'n'
for the dental phoneme /n̲/, however, the tests indicated that the use
of 'n' for both nasal phonemes /n/ and /n̲/ was unproblematic. The tests
also showed that the use of the digraph 'ny' caused recognition
difficulties, particularly in word final position. In this position
the Wahgi wanted to sound the 'y' symbol of the cluster as in the
English word *any*.

The use of the digraph 'ng' for the velar nasal phoneme /ŋ/ proved
totally unsatisfactory. The Wahgi continually pronounced it as either
(n) plus (g), or simply as (n). But since both English and Pidgin
English use this digraph, the practical considerations of conforming
to those alphabets dictates that it must also be used in the Wahgi
alphabet, otherwise the symbol /ŋ/ is the most suitable.

The tests demonstrated that the digraph for the velar lateral was
unacceptable in both medial and final positions, and that in the Southern
dialect 'k', 'c', or 'g', in that order, were the preferred symbolization.
However, because of the dialect overlap with respect to this phoneme
it was necessary to discover a symbol which when used would call forth
the response of the Northern alveolar lateral flap phoneme /l/ from the
people of the northern dialect, and the velar lateral phoneme /l�/ from
the people of the southern dialect. The only symbol proved to fulfil
these requirements was the symbol 'ł' or 'ɬ'. That is the lateral
symbol with either a hyphen or equals symbol passing through it.

The need to avoid a symbol which indicated either the velar or alveolar
places of articulation is reasonably self evident, but why 'ł' should
be more successful than other symbols such as 'l̲' is difficult to
ascertain. Possibly the symbol 'l' to the Southern Wahgi indicates
primarily the alveolar region, whereas 'ł' enables him to conclude
that the velar region is, in some way, being indicated.

This symbol proved to be problematic, however, when it was observed
that its hand written form was very similar to the hand written 't'
symbol as now taught in New Guinea's schools. The 'ł' symbol was
usually written as ł while the 't' symbol was taught as ⊢ . This

problem was solved by writing the lateral symbol with a double stroke, or equals sign, passing through it, as in the following symbol '≢' This solution proved satisfactory.

Finally the digraph used for the phoneme /l/ in word final position proved to be highly satisfactory, with the digraph 'lt' being the most satisfactory symbol. In word medial position the overall choice was for a single symbol, with a general preference for the symbol 'l'. But some notable exceptions should be noticed. In the dictation tests the symbol 'r' was the main choice for this phoneme in word final position, while in the Flash Card tests the digraph 'll' was an alternative choice to 'l'. It must also be borne in mind that in New Guinea the articulated response to the English and Pidgin English symbol 'r' is either the trilled or flapped phone. To the Wahgi, therefore, the sensed double articulation of the lateral in word final position, might easily be accommodated by the symbol 'r'. Further to this, some dialects represented in the Tests exhibit the phoneme /r/ as a dialectical variant of the lateral /l/ in word final position. These points might account for the high frequency of occurrence of the symbol 'r' in word final position. Because the symbol 'r' is already being used for the /t-r/ phoneme as it occurs in certain locations, it is unable to be used for the /l/ phoneme. Equally the total absence of 'll' in the dictation tests results is sufficient evidence to presume that its use for /l/ in word medial position would not be complied with by the Wahgi. Further, the symbol 'll' in word medial position often caused the enunciation of the word final allophone (lt).

4. SOME CONCLUSIONS

What has been the influence of English and or Pidgin English alphabetization of the Wahgi's choice on symbols for his alphabet? Firstly it should be noted that where a digraphical symbolization had been chosen for a sound: the phoneme or the allophone, which he perceived as a single segment, the digraph was rejected. The English and Pidgin English symbol 'ng' for the phoneme /ŋ/ is the most obvious example; the use of the symbols 'mb', 'nd', 'nj', in word initial position and their rejection in that position is another example. The use of the digraph 'gl', which has been a common form of symbolization used by Europeans in New Guinea for the velar lateral, also proved unsatisfactory.

It can be concluded therefore that education in either English or Pidgin English had not prepared the Wahgi for the use of digraphs in his

own language for sounds which he perceived as a single segment. Since
the subjects chosen to act in the tests represent reasonably well
educated students - relative to New Guinea - it can be presumed that
it would be incorrect to conclude that because a student can use these
digraphs in English or Pidgin English texts he can also use them in his
own language. It would appear that the student has been able to gain,
from an education in English and/or Pidgin English, an appreciation of
the general English phonic quality signalled by the letters of the
alphabet, and that he prefers to equate these with how he perceives his
own phonemes or allophones. He is not prepared to view a symbol in an
abstract way, that is, he will not view the symbol 'll' as the represent-
ation of the velar lateral fricative merely because the educationalist
presents it to him in this way. For him the symbol 'll' stands for a
double segment occurring in the general dental and alveolar regions
of the mouth. Similarly he will not accept the idea that because the
Wahgi language has the phoneme /t/ that it should be given a single
symbol to represent it in the alphabet. Pike says, and I quote, "A
basic phonemic assumption in linguistics is that the easiest alphabet
for an illiterate native to learn to read is a phonemic one - one
significant sound to each symbol, and one symbol to each significant
sound. It is assumed that the essential feature of learning to read
is to form a conscious or unconscious connection between an acoustic
symbol and a written one. This can most readily be done when there is
a one to one correspondence between spoken and written symbol. Every
departure from this ideal slows down the learning process - although
there is available no test to determine the amount of such interference.'[12]
Pike's underlined part above limits the above statement to the illiterate,
but I feel that the following facts should be borne in mind: a) the
subjects chosen to undergo the tests would be considered to be semi-
literate by the average Australian standard of literateness; b) the
subjects chosen for the tests were newly literate in a language other
than their own; c) the subjects chosen for the tests were in effect
illiterate in their own language.

By point (a) above I mean that the student's speed of reading, and
his comprehension of what he reads, because of the language difficulty,
would be relatively low when compared with the Australian schoolboy of
similar age. By point (b) I mean that a student newly literate in a
language other than his own does not produce normal phonemic responses
equated with the symbols written in the test, but rather produces an
approximation of what he has been taught to say. His response is
further modified by interference from his own language, his ability to

remember what it is he should be saying, and his ability to handle the new and other difficult pronunciation of the new language. By point (c) I mean that since little translation work into this language has been done by others apart from myself, and my own work had not come to the attention of the students in question, it is a justifiable assumption to believe that these students had read no literature in their own language.

With these three points as a background I think that Pike's statement might be studied in the light of what the tests have shown: The tests have shown that the idea of an isomorphic correspondence between phoneme and symbol needs to be modified to an isomorphic correspondence between, on the one hand, certain phonemes and symbols, and on the other, certain allophones and symbols. Concerning departures from Pike's ideal slowing down the process of learning to read, these tests have shown that sometimes the reverse of this is the truth: that is where a one to one correspondence was maintained the readers were retarded in their ability to read the text.

English and Pidgin English, therefore, have given to the Wahgi an awareness of the general English and Pidgin English phonic qualities which symbols stand for. Now, acutely aware of some of his own allophones, he equates the most likely available symbols to those allophones. The resultant alphabet is highly usable and satisfactory to the Wahgi, although it does not fulfil the ideal of the linguist.

Professor Hammarström has pointed out that as the Wahgi literate identifies more closely with English and Pidgin English, he may reject the unusual symbol 'ɬ', chosen for the velar lateral fricative, in preference for the more acceptable symbol 'll' or some other symbol used in English or Pidgin English. My own observations indicate that the Wahgi of the Southern dialect, will use the symbol 'k' for the velar lateral, and the Wahgi of the Northern dialect, will use either 'lt' or 'r' for that dialect's variant of the velar lateral. Nevertheless for some time to come speakers of both dialects will respond to the symbol 'ɬ' with the diaphoneme of their respective dialects.

5. THE TESTS

A series of psycholinguistic tests were conducted in the Wahgi area during 1969, and a further set of tests were conducted in 1971, [f.4.]

The tests consisted of three stages: a set of (185) flash cards which exampled the various problem areas; a set of (58) words which we asked the informants to write as dictated to them; and a set of short texts which we had the informants read on to tape recordings. (See appendage 5 for the materials used).

Certain restrictions were imposed on those being tested: we insisted that they should not have been influenced in any way by any of the books which we had published in their language, or by the alphabet which we were using; that they receive no instruction prior to the tests; and that they have completed or be attending grade 5-6 at school.

The scheme of testing which was followed was first to present the dictation test to a massed class, or individual who may not be attending school at that time, then to select from the class, on the advice of the teacher, some of the brighter students who would sit for the flash card and reading tests. The results of the dictation test were simply noted and assessed. The informant was marked either right or wrong for his response to the flash card test, or the incorrect response which he gave was noted. In the flash card test the student was given a period of approximately 5 seconds to respond to the word presented. He generally required much less than this. In assessing the recordings of the reading tests we looked only for the student's ability to respond to certain symbolization used in the texts. The symbolization being investigated has been underlined in the texts in appendage 5, but was not underlined in the original texts used.

242 students were used in the Dictation tests; and 58 students were used for both the Flash Card and Reading tests.

The proposed alphabet arrived at as a result of these tests indicates the present day subconscious phonemic responses of the Wahgi to the sounds of his own language as seen in the symbols which we placed before him.

5.1. *THE PROPOSED ALPHABET* as a result of the tests.

	WORD POSITION		
PHONEME	ini	med	fin
/mb/	b	mb	mb
/p/	p	p	p
/nd/	d	nd	nd
/t/	t	r/t	r
/ŋg/	g	g	
/k/	k	k	k
/ndz/	j	nj	nj
/s̲/	s	s	s
/m/	m	m	m
/n̲/	n	n	n
/n/	n	n	n
/ŋ/	ng	ng	ng
/l̲/		l	l
/l/		l	lt
/l̩/		ɬ (ɬ)	ɬ (ɬ)
/w/	w	w	
/y/	y	y	
/i/		i	i
/ɪ/		i	i
/e/	e	e	e
/a/	a	a	a
/u/	u	u	u
/o/	o	o	o

5.2. *A BRIEF SUMMARY OF ALL THE TESTS*

This summary indicates the dominant choices made by the students in all three types of tests.

	FLASH CARDS			DICTATION			READING		
	ini	med	fin	ini	med	fin	ini	med	fin
/ndz/	j	nj	nj	j	nj	nj	j	nj	nj
		ns	ns						
		j							
/mb/	b	mb	mb	b	mb	mb	b	mb	mb
		mp	mp						
/nd/	d	nd	nd	d	nd	nd	d	nd	nd
		nt	nt						
		d							

5.2. (continued)

	FLASH CARDS			DICTATION			READING		
	ini	med	fin	ini	med	fin	ini	med	fin
/n̲/	n	n	n	n	n	n	n	n	n
/ŋg/				g	g				
/t/					nat			nat	
/i/					i	i		i	i

Both Dialects

	FLASH CARDS			DICTATION			READING		
/ḷ/		ǂ			k/l	k/l		ǂ	ǂ
/l/		l	l t		l	r		l r	l t
		l l						l t	

Clusters

```
/ḷmb/  either   ǂmb              /ǂt/  either  l t
                                    +
                ǂb               /ǂmb/kb
                                    +
                l mb             /ǂmŋ/km
                                    +
                l b              /nŋ/ng
/ḷmŋ/           ǂming
```

Where no definite choice was made the results have not been indicated here.

It should be borne in mind when considering the tests that not all the students mentioned sat for all the words and texts used, but that extra words and new texts in different alphabets, were added to the series as new problem areas were discovered. For instance when we began testing, the problem associated with /ḷ/ was realised, but because of the dialect problem, considered to be unsolvable. However as the tests progressed it was observed that the /ḷ/ was one of the major areas of difficulty and that it should be investigated thoroughly. Subsequently several extra texts were added to the series which, beside testing certain other symbols, were in the main used to test symbols for this phoneme.

The results of the tests therefore indicate the overall response of the students throughout the period of testing.

In appendage 7 the areas of the highest frequency of response to the symbols used have been circled in order to aid the reader of this paper.

6. MATERIALS USED IN THE TESTS

6.1. WORDS USED IN THE FLASH CARD TESTS

/ndz/

nju	*name*	punjin	*we went*	kenj	*matter*
njel	*another*	anja	*outside*	kanj	*I saw*
njek	*mark*			pinj	*I knew*
nson	*name*	kansip	*star*	kens	*matter*
nse	*where*	wansip	*wander*	kans	*I saw*
nsi	*cold*			pins	*I knew*
ju	*name*	pujin	*we went*	kej	*matter*
jek	*mark*			kaj	*I saw*
				pij	*I knew*
				aj	*do*

/mb/

mbek	*as*	embe	*as*	amb	*womam*
mbu	*thought*	ambuk	*girl*	akamb	*people*
mbil	*full*				
mpa	*but*	ampuk	*girl*	amp	*woman*
mpi	*cold*	ompun	*heavy*		
mpuk	*book*	empe	*as*		
bok	*fall*	ebe	*as*	ab	*womam*

Others with /mb/

mokmbe	*be*			pakilmbe	*place*
ambikmbe	*held*	pilmbe	*know*	pilbe	*know*
ambikbe	*hold*	pakilbe	*place*	mokbe	*place*

/nd/

ndom	*he said*	wonda	*he will come*	ond	*tree*
ndum	*try*			bond	*wrote*
ndok	*frog*			pund	*I went*
ntok	*frog*	ente	*a*	ont	*tree*
nto	*hit*	ontum	*his tree*		
ntop	*fire*	puntum	*shape*		
dop	*fire*	woda	*he will come*	od	*tree*

/ŋg/   golum gal   *reed*   nagǫk   *not die*
       gak   *cook*   nagak   *not cook*
       gelt   *read*
       ga nel   *tear*
       gok   *die*

/n̠/   nim   *you*   kone tom   *rain*   kin   *us*
       nyim   *you*   konye tom   *rain*   kiny   *us*

/!/   aklamb   *people*   nokl   *water*
                     noklum   *water*   ambukl   *girl*

                  pulum   *root*   nol   *water*
                                   al   *east*
                  aǂamb   *people*   noǂ   *water*
                  noǂum   *water*   boǂ   *bed*
                  aǂte   *west*
                  aǂe   *east*
                  moǂmbe   *be*
                  ambiǂmbe   *hold*
                  moǂmnge   *be*

                  aglamb   *people*   nogl   *water*
                  boglum   *bridge*   ambugl   *girl*

                  akamb   *people*   nagok̠   *not die*
                  nok̠um   *water*   bok̠   *bed*

                  axamb   *people*   kex   *send*
                  bexum   *bridge*   nox   *water*

                  allamb   *people*   kell   *send*
                  nollum   *water*   noll   *water*
                  mullum   *egg*   ambull   *girl*
                  gollum   *die*   gall   *cook*
                  pullum   *root*

                  akamb   *people*   kek   *send*
                  nokum   *water*   nok   *water*
                  pokum   *root*   ambuk   *girl*
                                     nagak   *not cook*

		gak	*cook*
aǩamb	*people*	noǩ	*water*
aʌamb	*people*	noʌ	*water*
agamb	*people*	nog	*water*
		gog	*die*
		ambug	*girl*
		nagag	*not die*
acamb	*people*	noc	*water*
		ambuc	*girl*
		nagoc	*not die*
		gac	*cook*

/l/				
	gollum	*reed*	gell	*read*
	pullum	*root*	ga nell	*tear*
	pultum	*root*	ga nelt	*tear*
	goltum gal	*reed*	gelt	*read*
	puldum	*root*	ga neld	*tear*
	golum gal	*reed*	geld	*read*
	pulum	*root*	gel	*read*
	golum gal	*reed*	ga nel	*tear*
	golrum	*reed*	gelr	*read*
	pulrum	*root*	ga nelr	*tear*
			belr	*read*
			gel̲	*read*
			bel̲	*read*

6.2. WORDS USED IN THE DICTATION TESTS

/n̲/		
	n̲ɪm	*you*
	en̲e	*sun*
	mokɪn̲e	*food*
	kɪn̲	*us*

/ndz/				
	kɪnjɪn	*us*	pɪns	*I knew*
	punjɪn	*we go*	kans	*I saw*
	nju	*a name*	ans	*matter*
	kenj	*matter*	anja	*outside*

```
        tomɪns    post
        njɪmbɪl   place


/mb/    amb       woman
        omb       sugar
        mba       but
        mbok      fall
        embe      as
        nombuḷ    we eat


/nd/    ndop      fire        tonda     I will hit      ond    wood
        ndonum    burning     ende      a               tond   I hit
                              wonda     he will come


/i/     yi        man         mi        I am            pimamni    many
        mim       he is       nipɪm     he said


/l/     ŋgel      read        pulum     root
        ŋgolum    reed        mbelndɪl  read
        mbel      read        ga nel    tear


/ḷ/     noḷ       water       aḷamb     people          ŋgaḷ    cook
        ŋgaḷe     cook        kuḷaḷ     a place         ŋaḷ     child


/ŋ/     kuḷaŋ     spear       ŋaŋ       young man
        ŋaḷ       child       aŋanan    my brother


/t/     natonam   do not hit


/ŋg/    naŋgal    do not cook
        naŋgor    I am not dying
        ŋgor      I am dying


Clusters used
        moḷmbe    he is       konŋan    work
        pakɪlmbe  place       moḷmŋe    they are
        moḷmbɪḷ   they are
```

6.3. *THE TEXTS USED IN THE READING TESTS*

(The underlined letter in all tests except Test 9 indicate the letter being tested, in test 9 it indicates both the letter being tested and the symbol i.e. underlined lateral 'l'.)

Text 1. This text does not contrast i/ii, n/ny, and uses 't' word initially.

Ju elim angip yi 12 pela wi tonge, elim mom kone wojip. Wominge, yi tall ni eri kone yem yem allab mojip kone ni kem. Kellbe, "Na er kere, enim pu kipe kes kubullang moram allab el er ori keram.

    Pi enim punam el apull eri abill si punam.

    Yap pore pore mokine na, kon na, ku moni na, na sinam.

    Kon tuall edi eri sib, sib, er si punam.

    Punabe, allab pede mollub, 'enim ele nawonam. Kin enim

    yu napisamin', pa nijip ken, enim 'Kell punamin', ni enam.

    Erib, sib tol kibak ni mokil sekellib, kell punam.

    Ebe enabe, allab buse pilib, 'Ju angip kem yi ya ele, 'Ma', ni

    enim', ni pisam, pa nipim.

    Ninge, enim enim pu ori allab mojip kone kangip to ninam.

    Nib, kipe kes pore pore kubullang mom allab er sekellib,

    kes erim allab kopungum ka wei ngob, er ka ejip.

Text 2. This text uses the original alphabet used. That is it uses contrastive symbolization for all phonemes, but does not use prenasalization.

Ju ala ebe nyim, "Ya opii kunum allab el allab na bell miim? Na bu se pis. Allab make rojip kunum ngall pu ngall jel keny ebe nyijip, 'Kiny enyim keny gising rojin ba, enyim gol naesim. Naenabe, kiny enim keny ga ejin ba, enyim kiny ga naejip'. Nyijip bell el, ya allab ebe miim. Jon allab noll pangim yii wom. Mokinye beres na noll dongal namom ba, enim, 'Jon kiipe', pa nyijip. Na yii ngall ya wob, noll na mokinye nod ba, enyim mollub, 'Yii el mokine dang no numan wile pum yii. ku rakis siirangjip allab na yap kes erangjip allab se nom yii miim.

Text 3. This text uses the alphabet of text 1, but introduces the use of prenasalization of obstruents in medial and final positions.

Se nonjino. Enim allamp ken kilal nagoram. Allamp wo enim ngans eri to goram. Yap jel naenam. Ju elim ngans to gollmbe, minman dopang kera, paim el, na mung ni enim ngont. Pilimp, elim ken kilal goram. Kai winu pimamni kes mim ba, endi ende pu tai pundan el punde, Ju elim

aure nandom. Enim bu se pilimp, 'kai winu el yap kisi, kinjin yap wei
mimin,' ni pil kilal nagosim. Enim peng enjin pimamni kes borum ba,
Ju elim gelt kanim.

Text 4. This text uses the alphabet of text 3, but replaces 'nt', 'mp',
'ns' with 'nd', 'mb', 'nj'.

   Yi nom ende ku moni pimamni sem. Senge, kunum kunum kon konull ka
eri erangim. Ermbe, mokine ka eri pimamni kes norangim. No mom kone
elim gar dallming ya mallang yap nasem yi ende mom. Mom yi el elim
nganjim kanj pimamni kes tom. Tom yi el, elim kangum Enj. Elim mollmbe,
'yi nom mokine bollang boi ni mene pum en aper nonal', ni er mom en, tu
pende womb, elim kisingamb pen to nonjip. Enim angam angam kanimb
moram. Morambe, anganjip yi ende yap kes er nim ken, enim mollumb,
''Nim embe naendil, 'pa ninambe, elim, 'Na kaimb gar', pa ni mim ken,
elim endan yap el enim aure ninam,' pa nim.

Text 5. This text uses the alphabet of text 4, but replaces 'll' with
'c'.

   Yi ende mocmbe, Ju mokine nondil, pa. Ninge, Ju pu elim gar gakring
pu bocang ame ni mom. Mocnge, ambe ende moc pim en, elim pu ambuc mom
kone embe nim, Nim pu aka gac, a nim. Ninge, ambuc pu ac garing aka
gam. Gacmbe, aka tu amb tua ngom. Amb en noc aip si Ju ngom. Ju
elim noc el na aka pende si yi ende ngom. Ngombe, elip elip tap to
nonjic. Nombuc, Ju embe nim, 'Na pi kec wuc punal, pa nim'.

Text 6. This text uses the alphabet of text 4 but replaces 'll' with
'g'.

   Agamb make to monjip kone ambug tag tuage mog mbug, wi to kawa ni
embe ninjig, Nim manim ka wei. Nim ngag ka wei kangig nom. Nombe,
elim kimbug ka wei sim, pa nim. Ninge, agamb mogumb, Nim Yi ka. Nim
agamb bug bag ngonun. Agamb yem yem wug ag pore nim kangum ambug si
mine kesim. Nim yi wugma wei min pa ninjip. Ni pore nim kunum el yi
nom en agamb enim enim gar yem kem.

Text 7. This text uses the alphabet of text 4, but replaces 'll' with
'k'.

   Yi tak wonjik. Wombuk, embe ninjik, "Akamb kombo, pisam. Kil yek
ak pu akamb ken embe ninjik, 'Enim ala yi amb kukang naroya. Kisi moka.
Yem yem akamb, wuk ak pa mim akamb embe moram', pa ni pa ninjik. Nimbik,
pi ak mene sekekmbik, ya wonjik, Wombuk enim ken embe ninambik, 'Enim
akamb kukang naronam,' pa ninjik. Ni pore ninjik, yi tak kek wuk mene
punjik.

Text 8. This text uses the alphabet of text 4, but replaces 'll' with
'ł', and uses 't' medially after na-.

   Yi tał wonjił, embe ninjił, Ałamb komb9, pisam. Kil yek ał pu
ałamb ken embe ninjił, Enim ala yi amb kułang natoya. Kisi moł. Yem
yem ałamb, wuł ał pa nim atamb embe moram, pa ni embe ninjił. Nimbił,
pi ał mene sekełmbił, ya wonjił. Wombuł, enim ken embe ninambił, Enim
ałamb kułang natonam, pa ninjił. Ni pore ninjił, yi tał keł wuł
mene punjił.

Text 9. This text uses the alphabet of text 4, but replaces 'll' with
'l'. This underlined symbol is the symbol tested in this text.

   Alamb make to monjip kone ambul tal tuale molmbul, wi to kawa ni
embe ninjil, Nim manim ka wei. Nim ngal ka wei kangil nom. Nombe, elim
kumbul ka wei sim, pa nim. Ninge, alamb molumb, Nim yi wulma wei min,
pa ninjip. Ni pore nim kunum el yi nom en alamb enim enim gar yem kem.

Text 10. This text uses the basic alphabet of text 4, but replaces
'll' with 'x', and introduces the symbols d-, n-, r-, and -lt-, naru-,
and -j, -x, and uses no prenasalization.

   Yi tax mojix, ede kangum Ej, ede Pultum. Moxbux, dei ede pu runabix,
pa nijix ba, yi ede, Ej kin ebe nim, Ma, dei ede ru narudil, pa, Pultum
kin ebe nim dei rudil, kaj kin, na popux si elip ronal, pa nim. Yi
tax yu el pilbix, kex pujix.

Text 11. This text uses the basic alphabet of text 4, but replaces 'll'
with 'gl', and introduces the symbols: nd-, nj-, mb-, and -ld-, -gl-,
and -gl, -l, -nd.

   Ndok na ngunj kone ende moglmbugl embe ninjigl. Ndok moglmbe,
Nim ond puldum kaninmo ma? a nim. Ngunj molmbe, Ond puldum nje sim?
a nim. Ndok moglmbe, yemto mande sim puldum, pa nim, ngunj moglmbe,
pil el na kanj pa nagl pa ndon? ndok moglmbe. Ond puldum el kamb
walpe gar ende sim. Kil pu kanambigl, pa nim.

Text 12. This text uses the basic alphabet of text 4, but replaces 'll'
with 'l', and introduces the symbols: nt-, ns-, mp-, and -lr-, -nt-,
-mp-, -ns-, -l-, and -l, -lr.

   Kil ntansil pore yu pulrum el napinsil, mpa, ampim yu pulrum pinsip.
Pinsip wo kin yu pulrum tan to ninsip. Pi pisil. Pinsip amp pi nse
mim? Pi wulte amp ente mim. Molmpe, yek nim yu alamp empe tan
tonota pum. Aling nsisas wonta kin pore pulrum pisamin.

Text 13. This text uses the basic alphabet of text 4, but replaces 'll' with 'ł' (that is lateral plus the hyphen passing through it), and uses the 't' symbol shaped as 'ł'.

Yi łał monjił, ende kangum Enji, ende Pulum. Młmbuł, dei ende pu łunambuł, pa ninjił ba, yi ende, Enj ken embe nim, Ma, dei ende łu nałundil, pa, Pulum ken embe nim, Nim dei łundil, Kanj ken, na popuł si elip tonal pa nim. Yi łal yu el pilmbił, keł punjił.

7. RESULTS OF TESTS

7.1. RESULTS OF FLASH CARD TESTS

Phoneme	Symbol	Symbol used and Position in Word		
		ini	med	fin
/ndz/	nj	10/38	60/63	42/47
	ns	6/42	27/28	44/47
	j	42/42	53/54	53/89
/mb/	mb	11/42	43/45	26/29
	mp	6/42	42/42	26/27
	b	77/81	37/45	34/45
/nd/	nd	21/42	45/45	39/42
	nt	9/42	42/42	34/39
	d	9/9	45/45	29/45

		Sth. Dia.		Nth. Dia.	
		med	fin	med	fin
/!/	k	65/68	55/57	0/12	0/9
	kl	2/33	9/19	1/3	
	g	4/8	43/47		3/12
	c	17/19	5/8	1/3	1/3
	l		4/9		3/3
	ł	7/11	20/33	3/3	8/9
	gl	5/11	4/11	0/3	0/3
	k	11/11	11/11	0/3	0/3
	x	7/7	5/7	0/3	0/3

7.1. (continued)

Phoneme   Symbol

		Sth. Dia.		Nth. Dia.	
		med	fin	med	fin
/ḷ/	ll	0/11	3/33	(3/3)	(8/9)
	ƙ	(3/3)	(3/3)	(3/3)	(3/3)
	ʌ	0/2	0/3	1/3	1/3

		Position of Occurrence			
		Sth Dia.		Nth. Dia.	
		med	fin	med	fin
/l/	l	(99/106)	3/22	7/9	1/6
	lt	19/45	(62/68)	3/3	(5/6)
	ld	13/24	45/59		5/9
	lr	8/19	27/56	0/6	1/6
	ll	(22/22)	12/19	5/6	(4/5)

		ini	med	fin
/ṇ/	n	(63/63)	(63/63)	(62/63)
	ny	17/27	23/27	13/24

Clusters

		med
/ḷmb/	ɫmb	21/25
	ɫb	24/24
	lmb	24/24
	lb	24/28
/ḷmŋ/	ɫmng	0/10
	ɫming	4/4

Vowels

		med	fin
/i/	i	62/72	45/45
	ii	24/30	25/27

7.2. RESULTS OF DICTATION TESTS

Phoneme	Position	Symbol used and the number of times used
/mb/	Initial	b (61), mb 2
	Medial	b 15, mb (74), mp 6, m 1
	Final	mb (211), mp 96
/nd/	Initial	d (123), nd 1, t 4
	Medial	d 8, nd (100), nt 10
	Final	d 10, nd (358), nt 73, n 1, ns 1
/ŋg/	Initial	g (100%)
	Medial	g (40), ng 1
	Medially after na- (negative prefix) g (20), ng 2	
/ndz/	Initial	j (103), g 2, z 4, d 8, s 6, t 3
	Medial	j 10, nj (91), ns 8, nd 3, nz 1, nt 13, ng 18
	Final	j 6, nj (245), ns 108, z 2, nt 5, nz 5,
		njs 6, nc 1, ng 4, s 7
/n/	In all positions written as n .	
/ŋ/	Initial	ng 6, n (25)
	Medial	ng 2, n (3), g 1
	Final	ng 2, n (3)
/t/	Initial	r 4, t (10)
	Medially after na- (negative prefix) t 12 , r 2	

Phoneme	Position	Symbol used and the number of times used	
/ɭ/	Medial	g 36, k (44), l 1	Sthn dialect
		g 4, k 2, l (6), r 2	Nthn "
		g (5), k (5)	Over 25y
	Final	g 3, k (84), l 6, gk 1, cl 2, c 4	
		g 1, k 4, l (8), le 1	Nthn dialect
		k (9), l 1, gk ,	Over 25y

7.2. (continued)

Phoneme	Position	Symbol used and the number of times used	
/l/	Medial	l ⓘ23 , r 3, ld 23, lt 6, rd 1	Sthn dialect
		l ⑩ ,	Nthn dialect
	Final	l 26 , r㊵ , ld㉘ , lt㉒	Sthn dialect
		t 3, ln 2, rd 3	
		rt 2, rl 1, rn 1	
		k 2,	
		l 5, r 8, lt 2	Nthn dialect
/i/	Medial	i ㊼ , e 22, (dialect), ii 1	
	Final	i ㊾ , e 8, (dialect), ii 7, ee 6	

Clusters Investigated

Phoneme	Position	Symbol used and the number of times used	
/lnd/	Medial	rnd 3, rd 2, ld 4, nd 1	Sthn dialect
		ld 2, l̦t 1, lj 1, nd 2	Nthn dialect
/l̦t/	Medial	lt ⑦, kt 3, l 9, k 3	Sthn dialect
		lt 1, ld 3, l 4, nd 1	Nthn dialect
/l̦mb/	Medial	kmb 3, kimb 3, kamb 1 lmb 1	Sthn dialect
		kb ⑫ , lb 3, sb 1	
		lb 1	Nthn dialect
		gmb 1, lmb 1, kb 1, lb 1	Over 25y
/l̦mŋ/	Medial	km ⑦, kim 1, kn 1, nm 2, knm 1	Sthn dialect
		ln 1,	
		lm 1,	Nthn dialect
		km 1, gmng 1, lm 1	Over 25y
/kismb/	Medial	ksb 1, kesb 2, kelb 1, klb 1	Sthn dialect
		seb 1, lmb 1,	
		klmb 2, gsb 1, klb	Over 25y
/nŋ/	Medial	ng ⑭ , nn 5, nk 1, n 12, g 2	Sthn dialect
		ng 3, nn 1, ngn 2, n 1	Over 25y

7.3. RESULTS OF THE READING TESTS

Phoneme	Symbol and Position	Articulated Response	25 years	Sth Dia.	Nth Dia.
/ndz/	nj-	nVnj	1	6	
		∅	1		
		Vnj		5	1
		nj		4	1
		nje			1
		ne			1
	-nj-	nj		(92/114)	
	-nj	nj		(77/95)	
	j-	s	3		
		j		(103/110)	10
		nj	6	21	1
		∅	1	5	
		nd		1	
		n		1	
	-j	ns	26		
		s	10		
		wron	10		
		l	2		
		nd	1		
		n	1		
	-j-	nj	(153/156)		
	-ns-	nj	7	(151/160)	(20)
		s	3	11	2
		∅	1	3	2
	-ns	ns		(131/167)	
	ns-	n	2		
		nans	1		
		∅	2	1	
		send		1	
		nVs	5	3	
		s		3	
/nd/	nt-	nVC	11	10	6
		nd		4	1
		nV			1
		Vn			1
		∅			1

7.3. (continued)

Phoneme	Symbol and Position	Articulated Response	25 years	Sth Dia.	Nth Dia.
	-nt-	nd	5	9	
		∅	1		
	-nt	nt	(16/20)		
	-nd	no test			
	nd-	nVd	6	1	
		nVnd	3	(20)	6
		nV	3	4	2
		nd	1	2	5
		nok		6	
		∅		2	
		ndVn		2	
	-nd-	nd		(166/176)	
	-d	nt		13/19	
	d-	nd	9	(44/46)	12
		end		4	
	-d-	nd		36/39	
	b-	mb		(134/142)	
/mb/	mb-	mV	2	6	6
	-b-	mb		(163/204)	
	mb-	mb		2	
	-b	m		(175/237)	
	mb-	∅	1		1
	mb-	amb			1
	-mb	mb	(81/93)		
	mp-	mb	2	6	
		mV		3	4
	-mp	mp	4	(66/77)	8
	-mp-	mb	5	6	9
		mVC	2	3	
		mV			1
		∅			1
	lmp	l	2	3	
		p		1	1
	-mb-	mb		(86/105)	
		n			
/n/	n	all positions total		total	total

7.3. (continued)

Phoneme	Symbol and Position	Articulated	Response 25 years	Sth Dia.		Nth Dia.
/n/	-ny-			13/20		
	-ny			14/60		
	ny-			21/26		
/nat-/	nar	t	2	21		3
		r		3		3
		ø	1	2		
		nd		3		
/t/	t-		100%	100%		
	r-	t	10	14		
		ø	2	26		
		r		26		12
	nat-	ṭ		6		11
/ɬ/	Velar Lateral	-ɬ-	㊿	㉓	ɬ	㊸
		l	1	12		1
		ø	2			1
		r		1		
	naɬ	ɬ	4	4		
	-ɬ	ɬ	137	89	ɬ	135
		l	9+ɬ 18	31	k	1
		p	3 + 2	1		
		ø	6			
	-l-	ɬ	⑪	33		
		l	2	�36	ɬ	㉒
	-l-	ø	8	4		
	-l	ɬ	㉜	37	ɬ	㊱
		l	11	⑦⓪		
		ø	7	8		
		p	3	4		
		s		1		
	-x-	ɬ	5	5		2
		s		2		
		ks		1		
		k				1
		l		1		1
	-x	ɬ	㉒	�52		8
		ø	5	10		

7.3. (continued)

Phoneme	Symbol and Position	Articulated Response	25 years	Sth Dia.	Nth Dia.
		s	24	1	
		ks	18	3	
		r	1		
		l	4	(12)	
	-l	ɬ	1	5	ǃ 2
		ļ	2	13	ǃ 4
		ø	1		
	-l-	ɬ		1	1
		l	2	3	2
		l r		3	ǃ 4
	-gl-	gel	3		
		ḻ	6	13	6
		g-l	2	5	12
		kl		1	ǃ 8
		ø	3		
	-gl	ɬ	7	13	ǃ 9
		ḹ	2	15	
		g-l	1	3	
		gel	1		gǃ 5
		p		2	
		ø	2	1	no 1
	-c-	ǃ		50/56	
	-c	ǃ		118/120	
	-g-	ǃ/k		30/45	
	-g	ǃ/k		145/168	
	-ll-	l-l		50/50	
	-ll	lal		55/60	
	-k-	ǃ/k		80/81	
	-k	ǃ/k		168/168	
/l/ Alveolar lateral flap.	-lr-	ɣ	3	25	6
		l r	3	13	7
		l	2	3	4
		l t		6	6
		ø		6	2
	-lt-	l	1		ǃ 3
		l t	2	1	1
		ø		1	

7.3. (continued)

Phoneme	Symbol and Position	Articulated Response	25 years	Sth Dia.	Nth Dia.
	-lt	ĭ		(13/17)	
	-ld-	ĭ	9	29	10
		l-d	22	23	6
		∅	5	6	1
	-ld	ĭ		12	9
		∅		3	2
		l̲		7	5
		g-l			1
/i/	-i-	i		184/204	
	-i	i		(141/165)	
	-ii	i		38/46	
	-ii-	i		92/97	

N O T E S

1.   The Wahgi language is spoken by approximately 50,000 people
who live in and around the central section of the Wahgi Valley of the
Western Highlands of New Guinea. My wife and I, under the auspices
of the Summer Institute of Linguistics, have worked amongst the Wahgi
people since 1963.

2.   I would like to express my appreciation for the valued advice
given to me by Dr Alan Healey during the period of the tests.

3.   The Wahgi's response to an underlying form, and its relationship
to the historical reconstruction of a proto form of the language, may
hold the answer to this problem. This issue will be discussed more
fully in a paper to appear, which compares Wahgi with its related
languages.

4.   The second series of Tests, run in 1970, was financed with
monies from the Research Fund of the Summer Institute of Linguistics.

BIBLIOGRAPHY

BLOOMFIELD, L.
    1933   "Language". (New York, Holt, Rinehart and Winston).

CHOMSKY, N. and HALLE, M.
    1968   "The Sound Pattern of English". (New York, Harper and
              Row).

    1965   Some Controversial Questions in Phonological Theory
              (TL, 1, 97-138).

DINNEEN, F.P.
    1967   "An Introduction to General Linguistics". (New York,
              Holt, Rinehart, and Winston).

FISCHER-JORGENSEN, E.
    1954   Review of Louis Hjelmslev OSG, in *Miscellanea Phonetica*,
              II.

FUDGE, E.C.
    1970   Phonology-printed ir *New Horizons in Linguistics*, ed.
              J. Lyons. (Middlesex, Penguin).

GLEASON, H.A.
    1961   "An Introduction to Descriptive Linguistics". 2nd revised
              ed. (New York, Holt, Rinehart, and Winston).

GUDSCHINSKY, S.C.
    1960   "Handbook of Literacy". (S.I.L., Uni. Oklahoma).

HAMMARSTROM, G.
          "Linguistic Units, and Items". (To be published).

HARMS, R.T.
     1968   "Introduction to Phonological Theory". (U.S.A., Prentice
               Hall).

HARRIS, Z.S.
     1951   "Methods in Structural Linguistics". (Chicago, Uni. of
               Chicago Press).

HJELMSLEV, L.
     1961   "Prolegomena to a Theory of Language", Whitfileld F.J.
               (Madison, Wisc.).

KING, R.D.
     1969   "Historical Linguistics and Generative Grammar". (New
               Jersey, Prentice Hall).

LADEFOGED, P.
     1962   "Elements of Acoustic Phonetics", (Chicago, Uni. of
               Chicago Press).

LEHMANN, W.P.
     1962   "Historical Linguistics. An Introduction". (Chicago,
               Holt, Rinehart and Winston).

LUZBETAK, L.J.
     1954   "The Middle Wahgi Dialects Vol. 1, Banz Grammar".
               (Mimeographed, New Guinea).

LYONS, J.
     1969   "Introduction to Theoretical Linguistics". (Cambridge,
               London).

MARTINET, A.
     1960   "Elements in General Linguistics", (Paris).

PHILLIPS, D.J.
     1972   "Wahgi Phonology". (Mimeographed, Melbourne).

PIKE, K.L.
    1961   "Phonemics". (Uni. Michigan, ed., Ann Arbor.)

POSTAL, P.
    1968   "Aspects of Phonological Theory". (New York, Harper and
                Row).

SAPIR, E.
    1921   "Language: An Introduction to the Study of Speech".
                (New York).

TRUBETZKOY, N.S.
    1968   "Introduction to the Principles of Phonological
                Descriptions". (Hague, Matinus).

WURM, S., SMITH, G. and LAYCOCK, D.
    1969   The Future of Pidgin-Articles. Printed in New Guinea
                ed. Hastings, P. Vol. 4, No. 2. (Sydney, Sydney and
                Melbourne Publishing Co.)

REFERENCES

1. PIKE, pp. 128-138.

2. DINNEEN, p. 337.

3. MARTINET, p. 266, LIONS, pp. 81-84.

4. LUZBETAK, p. 3, LAYCOCK, p. 14.

5. PIKE, p. 131.

6. DINNEEN, p. 337, HJELMSLEV, p. 74.

7. PHILLIPS, p. 22.

8. TRUBETZKOY, pp. 7-10.

9. HAMMARSTROM, p. 12.

10. HAMMARSTROM, p. 6.

11. LUZBETAK, p. 13.

12. PIKE, p. 87.