



# *LSPNG 2016*

## Proceedings

Of

The Linguistic Society of Papua New Guinea 50<sup>th</sup> Conference  
Hosted by SIL August 2-4, 2016 @ Ukarumpa, EHP Papua New Guinea

## TOK PISIN PHONOLOGY: A PRELIMINARY STUDY

Jennifer Boer

M Phil research student

Supervisor: Cori Williams, Curtin University

### ABSTRACT

Tok Pisin, a major lingua franca of Papua New Guinea, has been widely studied. As Tok Pisin (TP) is a creole language, higher levels of variation than in other languages are expected. This descriptive study sought to confirm the adult phonology in the literature and test the hypothesis that the phonology of this adult population of multi-lingual speakers of Creole TP, Melpa (vernacular) and English may be different from the historical TP phonology described in the literature.

Participants – twelve adult speakers in Mt Hagen, Western Highlands Province – were recruited using convenience sampling. A sample was collected using a picture stimulus book. The samples were recorded and transcribed in International Phonetic Alphabet. Transcriptions were checked against the recordings with a native speaker. This data was then analysed using Excel and the Summer Institute of Linguistics resource ‘Phonology Assistant’ (PA). The individual word-based data analysed in Excel and the larger corpus of single word and connected speech data analysed in PA were both examined to note changes in the phonetic repertoire of this group. Phonetic inventories were then analysed individually to determine phonological inventories and the rules of distribution. In this population there were additions of fricative and affricative phonemes to the phonology and expansion to the rules of distribution.

The pilot forms the basis for a study of the normal acquisition of phonology in TP speaking children, a necessary foundation to the provision of Speech and Language Pathology clinical language and speech teaching services to this population.

**KEY WORDS:** Tok Pisin, Speech Language Pathology, clinical linguistics, phonology, core phonology, creole.

### INTRODUCTION

This pilot study of adult Tok Pisin speakers of Melpa substrate background in the Western Highlands Province (WHP) leads into a study of child phonological development in the region. It seeks to confirm the core phonology described previously in the literature (Romaine, 1992; Smith, 2002) and to compare that to the phonology of Melpa substrate speakers.

This clinical linguistic study is motivated by fledgling Speech and Language Pathology (SLP) services in the highlands region, based at the Mt Hagen Provincial Hospital, and the need to have access to normative data. Research to underpin assessment and treatment tools is essential whenever SLP services are commenced and in addition, it contributes important data on the nature of language (Maphalala, Pascoe, & Smouse, 2014).

Speech Pathology priorities will differ to pure linguistic studies, as they are motivated by the need to service caseloads under pressure of time and the complex physical, social and psychological foundations of communication skills (Crystal, 1982). Modern SLP has begun to attend to the needs of multilingual clients, both in research and service provision (Verdon, 2016).

## WHY CHOOSE TOK PISIN AS THE TARGET LANGUAGE TO DEVELOP SLP RESOURCES?

- Tok Pisin (TP) has vigorous lingua franca status in PNG (Wakizaka, 2008).
- TP's neutral status. TP as a lingua franca is far freer from tribal and clan limitations than individual vernacular languages. English, the language of wider communication, has an 'official position' (Siegel, 1997, p. 186) seen in its government and educational purposes but is not the preferred language of everyday communication. Tok Pisin has local ownership as is seen by its use in a 'wide range of public and private functions' (Mühlhäusler, 2003). Wurm described it as the 'intrinsic means of expression' for distinctly modern Papua New Guinean life (Wurm, 1985, p. 67).
- Papua New Guineans choose TP when they need a communication free of cultural rivalries and overlay. Nidue, describing what he calls a triglossic pattern of language use in his home village, says;  
    "All the people at Makopin speak Tok Pisin as a primary medium of inter-ethnic or cross-language communication" (1990, p 49).
- Because TP is widely used, resources developed in Mt Hagen in TP can be readily adapted to a number of settings in PNG.
- Value of the research. Romaine points out that "the phonology of creoles has been less well investigated than their syntax (2000, p. 184)".

## NATURE OF TOK PISIN

- Originally a pidgin - contact language.
- Creole status - has acquired native speakers since at least 70s (Sankoff, 1972). ( Siegel however, (2008) defines it as an 'expanded pidgin').
- Creolisation, a child-led process (Smith, 2002), began in the seventies (Sankoff, 1972) and continues to present generations (Mühlhäusler, 2003).
- English the main lexifier (Romaine, 2000).
- Substrate languages contribute syntax, suprasegmentals, and phonology.
- The phonology of TP may exhibit universal patterns some scholars have identified (Jakobson, 1968). Hua and Dodd (2006) in their multilingual studies explore the similarities and differences in the inventories and patterns of phonological acquisition of various languages' phonologies. There is much interest in 'universal' patterns, but this idea is, in itself, controversial as Evans and Levinson's comprehensive summary of the arguments indicates (Evans & Levinson, 2009).

## VARIATION

- Confirming TP phonology in the literature is complicated by the attention the literature must pay to regional and sociolinguistic variation, which is greater in a creole or pidgin than the variation normally apparent in other languages (Mühlhäusler, Dutton, & Romaine, 2003). Paliwala summarises;

In PNG, age of acquisition, multilingualism, the social role of Tok Pisin, and in particular access to English, all impact on the way the language is spoken” (2013, p20)

- Several sociolects of TP use have been described in the literature, according to sociological and geographic constraints, but the picture is likely to be even more complex than this with present day population mobility (Mühlhäusler, 2003).
- Additional variation occurs as a result of individual choices in language ‘performance’. Phonology varies with word borrowings and code mixing (Paliwala, 2012, King 2014).

### CORE PHONOLOGY

‘Core phonology’ (Romaine, 1992, p. 179) is a concept which accommodates variation around a phonological base. Variation can occur for a variety of sociolinguistic reasons, i.e., substrate variation, sociolect status of the speaker, context and stylistic changes (Mühlhäusler et al., 2003). A core phonology of TP consonants is shown in Table 1, the bracketed sounds were not included in all sources (Romaine, 1992).

**Table 1. Core Phonology**

	bilabial	labio-dental	alveolar	palatal	velar	glottal
Plosive	p, b		t, d		k, g	
Affricate			(dʒ)			
Fricative		(v)	s			h
Lateral/approximants	w		l	j	w	
Trill			r			
Nasal	m		n		ŋ	

Based on the historical core phonology in the literature (Mihalic, 1989; Romaine, 1992; Smith, 2002).

### STUDY AIMS

- Descriptive study of adult TP.
- Assess movement of stylistic variation into the phonology and changes to distribution.
- Examine changes to the phonology by observing features such as: phonologically contrastive use of [f] and [p]; [s] and [ʃ]; [s] and affricates; voicing of final plosives; contrastive use of [h] and [ʔ]; consonant cluster use or reduction; expanded fricative inventories.
- Establish an adult phonology for this population as a foundation for future cross-sectional child phonology developmental study.

## ETHICS STATEMENT

Ethical clearance was obtained through Curtin University Human Research Ethics Committee. Approval number RDHS-85-15.

## METHOD

Participants:

- Convenience sample, 12 adults from in and around Mt Hagen city. Educational levels, occupations and language exposure patterns displayed in **Table 2:**

Gender	Age	Occupation	Observed Education/language exposure
M	35+	Senior Teacher elementary	Professional English and TP
M	20+	Junior elementary teacher	Professional TP and English user
F	30+	Elementary teacher	Professional TP and English user
F	30+	Elementary teacher	Professional TP and English user
F	30+	Elementary teacher	Professional TP and English user
F	40+	Senior Teacher elementary	Professional TP and English user
F	25	Community member	Grade 10
F	43	Community member	Primary school only
F	25	Qualified nurse	Professional English & TP user
M	50	Pastor, community setting.	Diploma qualified
M	25	Physiotherapy resident	Tertiary degree
M	27	IT professional	Tertiary degree, English at home.

## MATERIALS

- Stimulus: specifically developed photo book of local scenes and objects. 62+ pictures designed to elicit the range of phonemes in TP. Target phonemes were based on the historical phonology plus additional phonemes observed in use locally and those recorded in the literature as new phones in use (G. P. Smith, 2002).
- Olympus LS-12 PCM voice recorder
- Software utilised: Excel, 'Phonology Assistant' (PA), a Summer Institute of Linguistics (SIL) resource.

## PROCEDURE

- Researcher requested consent, explained recording would occur, presented the photo book and requested responses in TP.
- Both single words and connected speech data were elicited, recorded and transcribed.
- Simultaneously broad transcription in International Phonetic Alphabet (IPA).
- Subsequently checked transcription with native speaker during transfer into Excel. Phoneme responses from target words were recorded- one cell per phoneme, recorded by syllable position; Syllable Initial Word Initial (SIWI), Syllable Initial Within Word (SIWW), Syllable Final Within Word (SFWW), Syllable Final Word Final (SFWF). Connected speech was also recorded in IPA.
- Following further phonetics training (Melpa focus) with SIL (Australia), prepared phonetic transcription of connected speech for PA analysis.

## ANALYSIS

- Single word analysis (using Excel) was based on single target words analysed for sound production in each syllable position permitted by TP distribution, for the core phonology plus phonological extensions noted by Smith (2002). Each target sound was rated on a four point scale to indicate:
  1. Successful elicitation of target phoneme
  2. Word and sound not elicited
  3. Sound omitted
  4. Sound substitution.
- The percentage of targeted phones successfully elicited, (rating1) were tabulated – by syllable position (distribution) and totals calculated. An expanded phonetic inventory was generated by items which were given a rating 1 or 4, although the contribution of rating 4 items was minimal. Distribution was also analysed to detect changes.
- The larger corpus of connected speech (PA analysis), based on a narrower transcription of the single words plus the full connected speech responses to each stimulus picture, was analysed using PA software. Individual phonological analyses were conducted following phonological principles (Burquest, 2006) to determine phonemic contrast in likely pairs and groups of phones. Each individual chart was examined and likely phone pairs or groups of phonetically similar segments within phonetically plausible natural classes were identified (Burquest, 2006, p. 14). These

were, in turn, examined for contrast to determine complementary distribution or free variation (Burquest, 2006, pp. 31-39). Patterns of distribution for TP described in the literature include devoicing of final plosives, consonant cluster reduction, reduction of affricates to [s], especially in final position, and a free variation of [f] and [p], possibly with use of the bilabial fricative (Mihalic, 1989). Individual phonologies were collated and phonological patterns for the entire corpus derived. Changes to distributive patterns and to the phonological repertoire were summarised and noted.

- The results of the single word analyses of phonetic inventory and distribution patterns were compared with the individual phonologies derived from the analysis of connected speech, and a revised phonology and changes to the distribution patterns were noted.

## RESULTS

Spontaneous production of target sounds (based on the historical core phonology) in single words across all positions is displayed in Table 3 below.

**Table 3. Percentages of successful elicitations of consonants in single words.**

Manner	Voiceless consonant	% successful elicitations	Voiced consonant	% successful elicitations
plosive	p	74	b	89
	t	82	d	75
	k	87	g	55
nasal			m	91
			n	74
			ŋ	67
fricative	f	83	v	40
			ð	8
	s	73	z	20
	ʃ	35	ʒ	31
			h	22
affricate	tʃ	33	dʒ	48
lateral			l	86
trill			r	94
approximate/glide			w	72
			j	85

## DISTRIBUTION

Not all sounds occurred with equal frequency in all word and syllable positions. Both the individual word and the connected speech analyses shed light on the distribution of phonemes. Table 4 shows the percentage of target sounds elicited successfully in the four syllabic positions examined. Table 4 is based on successfully elicited sounds in single words as a percentage of entire responses, rounded to whole numbers. Phones which occurred, but with percentages less than 50% were included in the chart but percentages not included, indicating that this type of distribution was seen, but not sufficiently to be regarded as a feature of the phonology.

**Table 4. Distribution of phonetic repertoire.**<sup>i</sup>

	% SIWI	% SIWW	% SFWW	% SFWF
Plosive	[p]78 [b] 92	[p]95 [b]79	[p], 62	[p] 63
	[t]85 [d]100	[t]86, [d] 63,		[t]69 [d]85
	[k]87 [g]81	[k]87, [g]	[k] 92,	[k] 83 [g]
Nasal	[m]94 [n]64	[m]90 [n]100%	[m]69 [n]85	[m]92 [n]90
			[ŋ]60	[ŋ]75
Affricate	[tʃ] [dʒ]69	[tʃ]		[tʃ]
		[dʒ]65		[dʒ]54
Fricative	[f]82 (v)	[f] 92 [v]100	[v]	[f]77 [v]
	[s]73 (z)	[s] 80 (z)	[s]88	[s]66 (z)
	(ʃ) (ʒ)	(ʃ)		(ʃ)
	(h)			
Lateral	[l]100	[l]89	(l)	[l]79
Trill	[r]95	[r]90	[r]	[r]85
Glide/Approx.	[w]67 [j]85	[w]82		

SIWI syllable initial word initial; SIWW syllable initial within word; SFWW syllable final within word; SFWF syllable final word final

### New Phonological Description

A new phonology for the consonants of this population was derived both from the individual word analyses conducted in Excel and the individual phonologies based on analysis of connected speech analysed using PA. The patterns derived from collated individual phonologies (based on PA analysis of single word and connected speech) are summarised below.

#### 1. Fricative use; Additional fricatives

Each participant showed variation to the historical phonology for TP fricative or affricate use;



[v] 75% had unchanged standard SIWI and SIWW TP use. 25% of participants had additional uses of SFWW and SFWF positions.

[z] 58% had introduced [z] into their speech but 92% did not use [z] contrastively. One (8%), participant 16, had [z] in all positions.

[ʃ] 92% had [ʃ] present. Some words, such as [fis] were original TP words with the new phonological use, but many were recent borrowings (not seen in Mihalic’s dictionary), as these samples from PA transcripts illustrate;

**Table 5. Samples of [ʃ] use from PA analysis**

Word in IPA	gloss	Syllable pattern	Participant and line identifier
ɪŋlɪʃ	English	VCCCVC	AO3F37032
fɪʃ	fish	CVC	A16M26035
fɪʃ	fish	CVC	AO9F22036
dɪʃ	dish	CVC	AO1M40018
ʃel	shell	CVC	AO1M40035
ʃauwɪn	sewing	CVVCVC	A05F42037
ʃauwɪn	sewing	CVVCVC	A0922037
ʃop	shop	CVVCVC	A02M24029
ʃolda	shoulder	CVCCV	A07F55002

Only 25% used [ʃ] contrastively with [s]. Minimal pairs were rarely seen in this study and here [ʃ]/[s] contrast was seen in similar pairs, for example with ‘matches’ and ‘machine’;

a_i			
maʃɪs		CVCVC	A07F55053
maʃɪn		CVCVC	A07F55037

There was also some contrast between [ʃ] and affricates.

[θ] 42% used [θ], most only once with the borrowed number [θripla] (three).

[ð], [ʒ] and [ʈ] all appeared in less than 25% of users, so were not significant.

[tʃ] appeared in 92% users but only 50% used the phone contrastively.

[dʒ] was seen in 100% speakers according to historical TP use. It was used contrastively with [tʃ] or [ʃ] in 50% speakers.

## 2. Affricates

All speakers had some SFWF affricate use but only 50% used the affricates contrastively with [s].

## 3. Devoicing final plosives; Changes to phonotactics through use of final voiced plosives;

All speakers had some SFWF voiced plosive use, but 42% of speakers showed some free variation around final voiced plosive usage.

## 4. Contrast of [f] and [p]

The group data and the data from individual phonologies suggests that there is an emerging contrastive distinction between [f] and [p] in many phonetic contexts for many speakers in this sample. In this sample 75% had clearly established contrastive use between the [f] and [p], which is different from the standard phonology of TP overall in the literature (G. P. Smith, Siegel Jeff 2013) This selection from the summary chart of selected participants, based on analysis of connected speech, demonstrates this development;

**Table 6. Summary (selected participants) of individual phonological use of [f] and [p].**

Participant no.	Contrast	Examples
9	Y	Similar pairs e.g. [pɪsm] / [fis], [pegɪm] / [femili]
10	Y	Similar pairs both in SIWI and SIWW e.g. [dʒɪpa] / [dʒenifa], [papi] / [fama]
11	Y	Similar pairs in SIWI and SFWF positions
12	Y	Similar pairs and no free variation (FV)
13	Y	Similar pairs, no FV
16	Y	Similar pairs, no FV

The bilabial fricative [ɸ] noted by Mihalic (1989, p. 5) was not recorded in these participant samples.

## 5. [w] and [v] contrastive use or free variation

A clear phonemic contrast between [w] and [v] was seen in this sample for 58% speakers. The remainder of speakers showed free variation of [w] and [v]. The PA sample from participant five demonstrating contrast in a similar pair is shown below.

Phonetic	Gloss	CV Pattern	Reference
#_i			
vɪlɪd̪	[is the same name t...]	CVCVC	A05F42021
wɪndau		CVCCVV	A05F42003

### 6. Initial [h] production versus [ʔ] substitution

Only 17% of participants had consistent SIWI [h] use in connected speech. The remainder showed free variation with omission of SIWI [h] or substitution of [ʔ]. This compares to 22% in the single word analyses.

### 7. Consonant cluster reduction (Mihalic, 1989, p. 6)

TP creole speakers are producing consonant clusters in a variety of positions, including SFWF positions in this sample. The insertion of epenthetic vowels between consonants is classically described in TP phonology (Mihalic, 1989; Smith, 2002). Some exceptions to these patterns are seen in these creole participants whose Tokples language Melpa has some strong consonant blend patterns in all positions (Ruby, 1990).

The standard TP phonotactic rule of consonant cluster reduction to a voiceless alveolar fricative [s] was strongly challenged by 92% of speakers in this sample. Examples of SFWF consonant clusters are seen in recent loanwords not found even in the Oxford dictionary (Volker, 2007) and is possibly an example of creole bilingual speakers having English phonology at their disposal as well as TP (Smith, 2002).

All the above findings are summarised in table 6 which sets out the new phonological inventory derived from both sets of analyses and which can be used as the foundation for the child phonological development study. The phoneme /h/ is used inconsistently but perceived as part of the phonology, as indicated by its inclusion in the orthography. Phones in round brackets are not included in the phonology but will be monitored in the child study. Table 4 (above) shows distributional limitations.

**Table 7. New phonological inventory<sup>ii</sup>**

	bilabial	labio-dental	dental	alveolar	post alveolar	palatal	velar	glottal
Stop	p, b			t, d			k, g	
Nasal	m			n			ŋ	
Affricate				(tʃ)	dʒ			
Fricative		f, v		(ʃ)				(h)
Trill				r				
Lateral				l				
approximant	w					j		

## DISCUSSION

Because the single target words were a semi structured sample, some of the changes to the phonology they demonstrated came from a narrow range of words which meant this sample

had a low Type Token Ratio<sup>iii</sup> and some changes to the phonology were demonstrated by a small number of words. For example, the dental fricative was seen mainly in counting where the English count noun [θri] ‘three’ is used, so these occurrences of [θ] have less phonological significance. Also, SIWI [dʒ] is seen mainly in [dʒɪpa] ‘zipper’ and [dʒisas] ‘Jesus’, but although there are few types, the consistency for tokens was very strong. Further research is needed to explore a permanent transfer of such segments into the phonology. Poplack (2012) suggests that the integration of phonological changes is one of the last permanent changes brought about in a language by borrowing and code-switching.

Although the phonological data derived from single word analyses and the individual phonological analyses derived from the connected speech transcribed were from different sampling approaches, there was consistency in the results. This information is of value to Speech and Language Pathologists whose clinical pressures often force them to use the smaller data base of a structured sample. Also, a narrower phonetic transcription is of value when pursuing clinical analysis, but the child research is interested in the phonology so can be based on a broad phonological transcription.

The comments made by participants on their lexicon and pronunciation revealed some cross-linguistic metalinguistic awareness. Further research into this phenomenon would be of value to explore how educational levels of speakers might impact on the creolisation process and speakers’ stylistic choices.

The individual phonologies were generated in PA according to phonological principles (Burquest, 2006). They examined each segment and each distributive feature of interest. The results from these were collated for the entire cohort and combined with data on the individual target words, which gave a strong picture of the phonology for this population.

#### **Adult phonology and distribution as a basis for the child phonological survey**

The reason for this pilot study was to generate a phonology for examination in the child population. Analysis of single word and connected speech data in adult participants were compared and similar results were evident from the two elicitation approaches. This supports the use of a single word task designed to elicit representative phonemes in TP. The final list of target words generated for the child phonology developmental cross-sectional study is derived from this adult study. The list is designed to elicit all phonemes recorded in the adult pilot, across word positions. Many words elicit multiple phonemes, sometimes in multiple syllabic positions. Variation means words may be elicited in multiple phonological realisations, so multiple word opportunities for realisations of a phoneme are given.

#### **CONCLUSION**

This pilot study in a Melpa background adult TP-speaking population achieved its goal of describing the phonology. It confirmed the historical core phonology, with some additions evident. These are more frequent use of voiced plosives, use of unvoiced affricates and allophonic SFWF voiced affricates. In this population, the most emphatic difference was in contrastive use of [f] and [p] by 75% of participants and the 92% of participants with SFWF use of consonant clusters rather than reduction of the superstrate lexifier form to fricative [s].

Thus there is an expanded phonetic repertoire with evidence of additional phonological developments. These findings provide a model against which to evaluate phonological development in TP speaking children in the Western Highlands province, with special validity in urban populations.

### Endnotes

(i) Re Table 4. It should be noted re SIWW and SFWW positions for phones that syllable breaks are uncertain, and some are geminate, that is they function both in SIWW and the SFWW position.

(ii) Re Table 7: New Phonological Inventory. Derived from individual phonologies based on connected speech plus information from analysis of single words. NB. Phoneme /r/ can be flap or trill, unvoiced plosives can be aspirated or unaspirated. Some sounds, such as [ʃ] and [tʃ] are merely emerging in this population and were targeted for observational rather than assessment purposes.

(iii) A Type/Token Ratio is obtained by dividing the 'Types'- the number of different words in a spoken or written text, by the 'Tokens' or the total number of words.

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