Loan Phonology in Wangkatja

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1.1 Introduction

All languages have strategies for generating new lexemes in their vocabularies. Coffin et al. (2022) identify lexical borrowing, among others, as one particular strategy by which languages can update their lexicons to be able to describe new and novel concepts, particularly in languages of the Goldfields region of Western Australia. Speakers usually pronounce loanwords in the receiving language differently according to the sound rules of the receiving language. At times, the assimilated words can sound quite similar to the source lexeme, and at other times, significant phonological filtering may occur. This paper will describe how Wangkatja phonologically filters Standard Australian English (SAE) loanwords, focussing on consonant and vowel phoneme changes from SAE to Wangkatja and strategies for respecting Wangkatja syllable structure rules. Furthermore, a model for describing phonological filtering for Wangkatja in a historical context is proposed.

1.2 Wangkatja

The Wangkatja language (other spellings found are Wangkatha, Wongutha, Wangkayi) is spoken in the Goldfields region of Western Australia (Hanson, 2008). Its AITSIS code is A103. It is spoken around the regional towns of Laverton, Leonora and Menzies (aiatsis.gov.au). The term Wangkatja in this paper is used to refer to the Western Desert Language variety historically spoken around Mount Margaret, approximately 30 km southwest of Laverton, and is not to be confused with the language originating from Cundelee Mission, 160 km east of Kalgoorlie, which has occasionally been referred to as Wangkatja/Wangkatha in the literature (Thieberger, 1993).

Wangkatja is a Western Desert language of the Wati subgroup (Hanson et al, 2022, O'Grady, Voegelin & Woegelin, 1966) and has features in common with Pitjantjatjarra and Ngaanyatjarra, and speakers have strong cultural connections to those language communities. It is a language associated with the Mount Margaret Mission which has come to replace the heritage languages of those first residents (Coffin, 2023). Anthropologist John Stanton (1984) did extensive field work at Mount Margaret and describes several waves of settlement at the mission from different Western Desert groups in the Goldfields, resulting in language varieties in close proximity for extended periods of time, which would not have occurred traditionally. Mount Margaret was a site where people from Mt Morgans, Laverton, Leonora and Kookynie were brought and migrated, and were speakers of Mankulkatjarra, Nyanganyatjarra and other groups (Stanton, 1984). Many Wangkatja community members today consider themselves to be descendents of the

Ngaanyatjarra sociolinguistic group (Gizem Milonas, personal communication, Thieberger, 1993).

Figure 1: missions and settlements to which Mount Margaret residents had connections
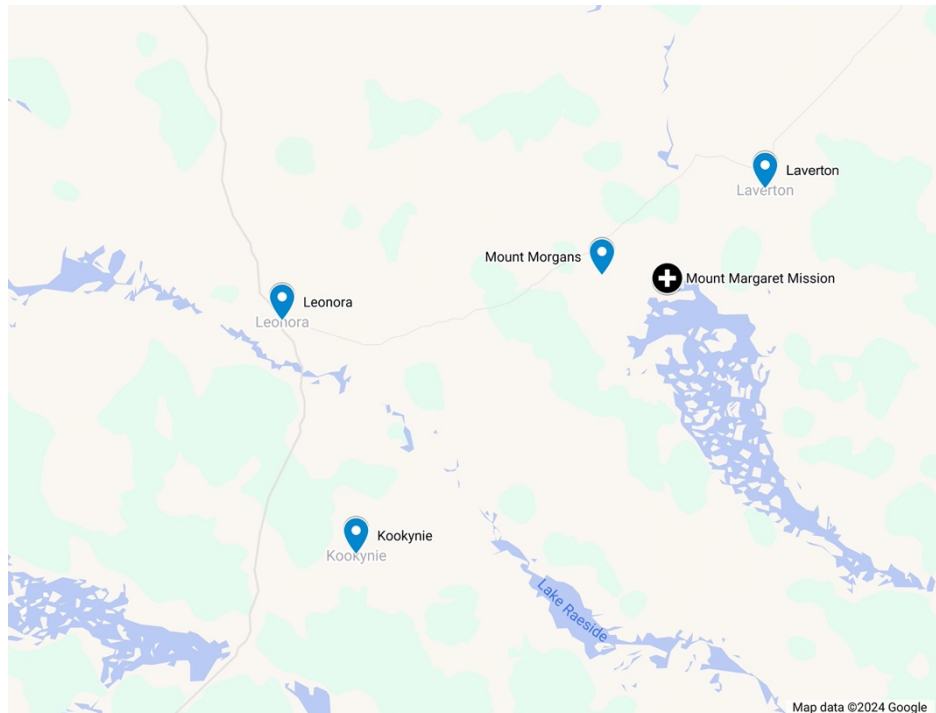
Figure 2: more distant missions and settlements to which Mount Margaret residents had connections
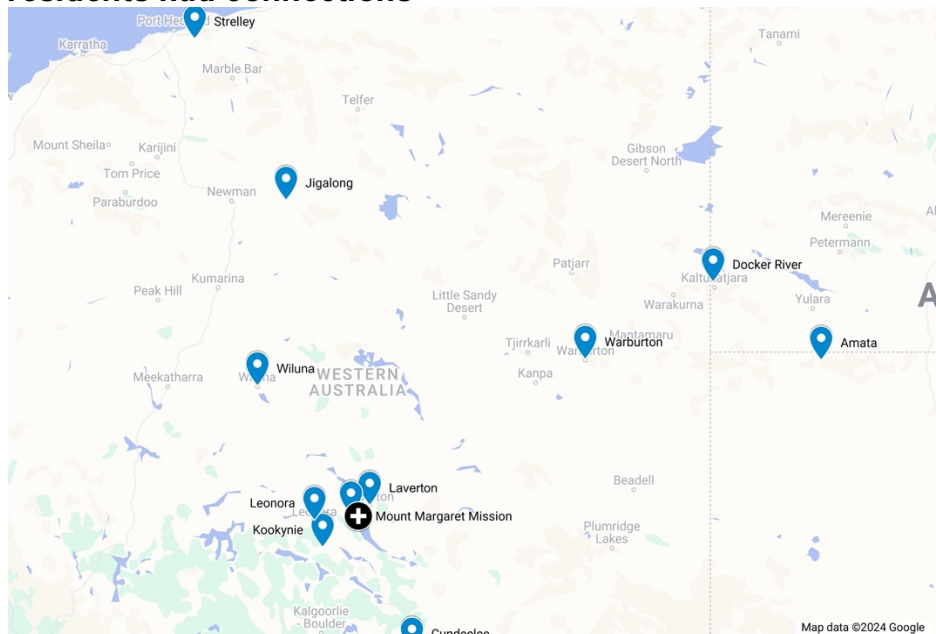
Mount Margaret Mission attracted Aboriginal people from within Western Australia and beyond: Kookynie, Leonora, Laverton and Mt Morgans (Stanton, 1984). Residents at the mission also frequently traveled to Docker River (currently called Kaltukatjara) on the Northern Territory – Western Australia border, Amata (SA), Wiluna , Jigalong, Strelley and Cundeelee (Stanton, 1983).

Migration from and contact with various Aboriginal groups resulted in potential influence from various dialects of Pitjantjatjarra and Ngaanyatjarra as these languages have been spoken in those areas traditionally as well as by displaced Aboriginal people (collection.aiatsis.gov.au).

2.1 SAE Loanwords in Wangkatja

European colonisation and missionary linguistics have deeply affected First Nations languages of the Goldfields, and a domain where this can be seen is in lexical borrowing from SAE, especially where particular concepts or objects did not traditionally exist (Coffin, 2023). As an Aboriginal language which has sustained contact with SAE as well as other languages of the Goldfields region, Wangkatja is an notable case of loan phonology as the phonological systems of SAE and Wangkatja are very distinct. Furthermore, with the possibility of SAE loans entering the Wangkatja lexicon in a variety of ways, directly from SAE or from other Aboriginal languages, different layers of filtering could be in effect, leading to complex and unexpected forms of the assimilated word when compared with the English source word. As Mansfield (2014) points out when discussing the influence of English and Kriol on Murrinhpatha, it is difficult or at times impossible to categorically say that any given assimilated word has come to be through contact with SAE or other Goldfields Aboriginal languages. In this paper, a description of loan phonology is given with little consideration to the path that the word has taken to enter the language, referred to in this paper as a language internal analysis. The intention of this paper is not to describe the phonology that describes and predicts lexical borrowing forms in Wangkatja in its entirety. Instead, the focus of this paper is to describe the major trends in how segments not found in Wangkatja traditionally are transformed and how Wangkatja adapts words to satisfy its strict phonotactic structure.

2.2 Wangkatja Phonology

Being a Western Desert language of the Eastern Goldfields (Thieberger, 1993), Wangkatja is likely to have phonological features in common with other Western Desert languages of the Wati subgroup, such as manner of articulation, place of articulation and phonotactic constraints. Like other Western Desert languages, voicing is not contrastive for oral stops (Rose, 2001, pp 109), hence unvoiced counterparts for stops are chosen in the phonemic orthography. Stops do not have aspiration.

The consonant inventory of Wangkatja is illustrated in table 1. The vowel inventory is illustrated in table 2.

Table 1: Consonant Phonemic Orthography for Wangkatja

	Bilabial	Apical Alveolar	Apical Post-alveolar (retroflex)	Laminal (Alveo-)palatal	Velar
Plosives	p	t	rt	tj	k
Nasals	m	n	rn	ny	ng
Laterals		l	rl	ly	
Rhotics		rr	r		
Glides	w			y	

Table 2: Vowel Phonemic Orthography for Wangkatja

	Front	Central	Back
High	i/ii		u/uu
Low		a/aa	

2.3 Wangkatja Phonotactics

A Wangkatja word must have at least two morae and can begin with a vowel or consonant, although more often than not begins with a consonant, which it has in common with other Wati languages such as Yankunytjatjarra (Goddard, 1985). As such, a monosyllabic word will have a long vowel or a short vowel with a final consonant.

(1) *tjaa* mouth

(2) *yuu* windbreak

(3) *tuu* thunder

(4) *turr* noise

Wangkatja syllables are of the type:

((C) [1]V (V) (C))   (C V (C))^n

The consonants *rt, rn, rl , ly* and *rr* are not found word initially, although word initially, stops may have a retroflex quality (Hanson, personal communication). Only nasals, laterals and trills are found word finally.

As a result of the Wangkatja syllable structure, consonant clusters may occur at the intersyllabic boundary. However, geminates do not occur. Below are the

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[1] V (V) indicates possible short and long monophthongs. Diphthongs are not found.

constraints on consonant clusters, using a similar analysis to Butcher and Tabain (2014) on Pitjantjatjarra.

Table 3: consonant cluster constraints

Homorganic nasal-stop	*ni**nt**i* clever
Heterorganic nasal-stop	*pu**np**unpa* fly species
Heterorganic nasal-nasal	*ni**nng**i* zebra finch
Homorganic lateral-stop	*wi**lt**ila-* to hold
Heterorganic lateral-stop	*pu**rlk**a* big
Trill/flap + C (rr C)	*pa**rrk**a* branch

2.4 Data and Method

The data used here have been drawn from the linguistic Toolbox database at the Goldfields Aboriginal Language Centre Aboriginal Corporation (GALCAC). The database contains over 3000 lexemes out of which 38 SAE loans were tagged. These lexemes have been collected from various Wangkatja speakers and are recorded in GALCAC orthography. The study is comprised of primary data, as well as secondary data from historical documents which have been complied in the Wangkatja Toolbox. A comparative analysis of SAE phonemes and Wangkatja phonemes was performed using Harrington, Cox and Evans (1997) transcription for SAE. A limitation of this comparative analysis is that it assumes that the language of the English speakers responsible for introducing the lexemes was uniform, i.e. that they all spoke in a similar way as SAE is spoken contemporaneously. For simplicity and language revitalisation purposes, contemporary SAE broad/phonemic transcription as this will enable speakers to assimilate SAE words into Wangkatja based on how SAE is spoken today. Throughout this paper, an asterisk (*) is used to indicate that the phoneme is not represented in the data, and cross-linguistic evidence or other language internal arguments have been used.

3 Consonants

The mapping of consonants from SAE to Wangkatja is described in this section. Some phoneme mappings have one-to-one relationships, reliably assimilating to Wangkatja phonemes very consistently. Some variation is also observed.

3.1 Oral Stops

Table 4 shows how oral stops is SAE map to Wangkatja phonology. Some stops reliably assimilate to Wangkatja phonemes.

/p,b/ → *p*
/k,g/ → *k*

In general, SAE voiced and unvoiced alveolar stops assimilate to the alveolar stop in Wangkatja. It always assimilates in this way when the SAE word has /t,d/ word initially.

/t,d/ → *t*, word initially

When SAE /t,d/ is intervocalic, the Wangkatja phoneme shows some variation. This may be related to how Wangkatja speakers perceived these sounds in these environments. The different phonetic realisations of the SAE phonemes in connected speech and in different regional varieties of English spoken around the Goldfields could also explain some of the variation. In examples (6) and (7), phonetic variants of the English words which may have lead to the Wangkatja forms are suggested.

(6) *kartapu*
cu**t** up
[kʰeɾep̚]

(7) *mirritjin*
me**d**icine
[ˈmeɾəsṇ]

This suggests that Wangkatja loan phonology is sensitive and perceptive to the variable phonetic realisation of stops, which in English can be quite variable, particularly intervocalically.

Table 4: Oral Stops

SAE source phoneme	Wangkatja phoneme	Wangkatja loan	SAE source
/p/	p	***p**ii**p**a* *ka**p**u* *al**p**a* ***p**urni* *tam**p**a* *tjii**p**i* *ya**p**ulpa*	**p**a**p**er ca**p** hel**p** **p**ony dam**p**er shee**p** a**pp**le
/b/	p	***p**ilangkiti* *raa**p**ita* ***p**aka* ***p**uluka* ***p**uurrpa* ***p**iki-**p**iki*	**b**lanket ra**bb**it **b**acca, tobacco **b**ullock **b**oss **b**ig-**b**ig
/t/	t	***t**awunpa* *raapi**t**a* ***t**awatji* ***t**ii* *tjaa**t**a* *pilangki**t**i* ***t**aya(ngka)*	**t**own rabbi**t** **t**rousers **t**ea shir**t** blanke**t** **t**ire
	rt	*ka**rt**apu*	cu**t** up
	ly	*wa**ly**pala*	whi**te** fellow
/d/	t	***t**ampa*	**d**amper

		tuuka	**d**og
		tukuta	**d**octor
	rr	*mirritjinpa*	me**d**icine
		nikirrpala	nake**d** fellow
	tj	*mitjitjin*	me**d**icine
/k/	k	*kapu*	**c**ap (hat)
		kii	**k**ey
		warrka	wor**k**
		pilangkiti	blan**k**et
		karrila-	to **c**arry
		nikirrpala	na**k**ed fellow
/g/	k	*kilarrpa*	**g**lass
		piki-piki	bi**g**-bi**g**

3.2 Affricates

There was no attested example of the SAE voiceless post-alveolar affricate in Wangkatja, but its voiced counterpart was present in the data. Since voicing is not constrastive in Wangkatja, it could be reliably said that SAE affricates map to /tj/. This is consistent with the findings of Coffin and Hanson (2022) where other Goldfields languages, such as Cundelee Wangka, Mirniny and Pitjantjatjarra, have SAE affricates replacing with lamino palatal stops, here with dental stops.

*/ tʃ, dʒ / → tj

The only affricate example is the Wangkatja toolbox is *tyayila* jail*.

(8) *tjayila*
jail
/dʒæɪl/

Table 5: Affricates

SAE source phoneme	Wangkatja phoneme	Wangkatja loan	SAE source
/ tʃ/	*tj		
/dʒ/	tj	*tjayila*	**j**ail

3.3 Fricatives

Generally fricatives reliably assimilate to stops near the SAE place of articulation. This is consistent with the findings of Coffin and Hanson (2022) where other Goldfields languages (Cundelee Wangka, Mirniny and Pitjantjatjarra) have palatal, alveolar and labiodental fricatives becoming lamino-dental and bilabial stops. Their findings are also consistent with the SAE glottal fricative /h/ being dropped. This leads to the following mappings:

/f,v/   → *p*
/ʃ, ʒ/   → *tj*
/θ, ð/   → *tj*
/s,z/   → *tj* (generally)
/h/   → /ø/ (dropped)

Coffin and Hanson (2022) predict that alveolar fricatives become stops in other Goldfields Aboriginal languages, and this is present in two words: *mirritji* medicine and *mitjitji* missus. However, this is not the case for two other examples below, which may have been borrowed indirectly from SAE through another Western Desert language such as Ngaanyatjarra, showing /s/ → rr patterning in the SAE syllable coda. This patterning is explained by segment modification in section 5.4.

(9) *puurrpa*
    bo**ss**
    / bɔ**s** /

(10) *kilarrpa*
    gla**ss**
    / glɛː**s** /

Table 6: Fricatives

SAE source phoneme	Wangkatja phoneme	Wangkatja loan	SAE loan
/f/	p	*walypala* *nikirrpala*	white **f**ellow naked **f**ellow
/v/	*p		
/s/	tj	*mirritji* *mitjitji*	medicine missus
	rr	*puurrpa* *kilarrpa*	bo**ss** glass
/z/	tj	*tawatji*	trou**s**ers
/ʃ/	tj	***tj**aata*	**sh**irt
/ʒ/	*tj		
/θ/	tj	*na**tj**i*	no**th**ing
/ð/	*tj		
/h/	ø (elision)	*ama* *alpa*	**h**ammer **h**elp

3.4 Nasal stops

Similar nasal stops are in the phonemic inventory of both SAE and Wangkatja, so as expected, assimilation is not as dramatic. There is minimal variation, except for *purni* pony which has become a retroflex nasal. It may be hypothesised that nasal alveolar stops become retroflexed in the intervocalic position, but with only one intervocalic token, there is doubt that /n/ maps to *rn* in all cases.

Table 7: Nasal stops

SAE source phoneme	Wangkatja phoneme	Wangkatja loan	SAE source
/m/	m	*ta**m**pa* ***m**irritji* *a**m**a* ***m**utuka* ***m**itjitji*	da**m**per **m**edicine ha**mm**er **m**otor car **m**issus
/n/	n	***n**iila* ***n**atji* *tawu**n**pa*	**n**eedle **n**othing tow**n**
	rn	*pu**rn**i*	po**n**y
/ŋ/	ng	*pila**ng**kiti*	bla**nk**et

3.5 Approximants

Approximants are found in the consonant inventory of both languages. As such, SAE approximants are expected to reliably map to similar Wangkatja phonemes with little variation.

There is no attested word containing the SAE /j/ phoneme in the Wangkatja Toolbox. However, as the Wangkatja *y* is used extensively for traditional Wangkatja words, it is predicted that /j/ reliably assimilates to *y* in Wangkatja with little variation. This leads to the below mappings for approximants.

/w/ → w
/j/ → y
/l/ → l

The SAE rhotic approximant /ɹ/ requires extra attention. Generally the below mapping would be predicted.
/ɹ/ → r
However one token (*tawatji* trousers) defies this pattern.

(11) *tawatji*
trousers
/ˈtɹæɔzəz/

Two plausible explanations arise. Coffin and Hanson (2022) argue that epenthetic vowel insertion is used to satisfy (C) V (V) (C) phonotactic structure, that is to say, that the initial consonant cluster /tɹ/ is not permissable and must be modified. If epenthesis is active in trousers *tawatji* as suggested, then in this case the SAE rhotic /ɹ/ maps to the Wangkatja /w/. On the other hand, phonetically, the SAE consonant clusters /tɹ/ is often realised as [tɹ̥] due to carryover coarticulatory devoicing. During the contact period with English,

speakers may not have been able to perceive the devoiced rhotic, so /ɹ/ may just have been dropped. The second analysis then implies that the diphthong in the SAE trousers /æɔ/ is transformed to a glide /awa/, rather than the SAE rhotic transforming to a glide. Further, carry *karrila-* may suggest that SAE /ɹ/ becomes *rr* (trill/tap) intervocalically. The second analysis is more consistent with the analysis on vowels in this paper, where certain diphthongs often have a glide in Wangkatja, but should be treated carefully and with suspicion as this is based on single tokens. This leads to the following mapping:

/ɹ/ → r, (SAE word initially)
　　→ rr, (SAE word medially)

Table 8: Approximants

SAE source phoneme	Wangkatja phoneme	Wangkatja loan	SAE source
/w/	w	***w**arrka*	**w**ork
/j/	*y		
/l/	l	*pu**l**uka* *ki**l**arrpa* *nii**l**a* *tjayi**l**a* *pi**l**angkiti*	bu**ll**ock g**l**ass need**l**e jai**l** b**l**anket
/ɹ/	r rr	***r**aapita* *ka**rr**i(la)*	**r**abbit ca**rr**y

4 Vowels

Lots of variation in both monophthongs and diphthongs is present. In most cases, constrastive environments explaining the variation was not found. As Wangkatja is a mixed language with many possible language influences and has a tendency to employ other strategies for forming new lexemes, such as semantic extension (Hanson, personal communication), it is not too surprising that the Wangkatja Toolbox has relatively few SAE loanwords. As a result, it is suspected that much of the variation in vowels is due to "frozen" forms, which are unchanged from language contact with other language groups (Pitjantjatjarra, Ngaanyatjarra among others) who speak similar Western Desert languages with similar phonologies. As these "frozen" forms already obey the phonology and phonotactic structure of syllables, there was likely no need to further adapt the lexical borrowing any further. While acknowledging that there may be such "frozen" forms which are not consistently and predictably filtered from SAE to Wangkatja, a language internal (Wangkatja only) analysis is still useful because it guides speakers to adopt new lexemes when this is required. Some SAE phonemes reliably map to Wangkatja phonemes and speakers can make decisions about which phoneme best suits the word where there is a lot of variation.

4.1 Monophthongs

One phoneme that reliably assimilates is the SAE tense high front vowel in *kii* key, leading to the following rule which does not have any exceptions in the

Wangkatja Toolbox. However, this vowel has only been observed in the first syllable, which is the only position where long vowels in Wangkatja may be found, hence the following mapping is proposed:

*/iː/ → ii, i

There are no tokens of the SAE vowels /oː/ and /ʉː/ in the Wangkatja Toolbox, so suggestions have in this case been taken from the closely related Pitjantjatjarra.

(Pitjantjatjarra /oː/ → uwa)
    (12) *tuwa*   (Langlois, 2004)
        d**oor**
        / d**o**ː /

    (13) *tjuwa*   (Langlois, 2004)
        st**ore**
        / st**o**ː /

(Pitjantjatjarra /ʉː/ → uu, u)

    (14) *puuta*   (Langlois, 2004)
        b**oo**t
        / b**ʉ**ːt /

    (15) *ruuma*   (Langlois, 2004)
        r**oo**m
        / ɹ**ʉ**ːm /

(Pitjantjatjarra /eː/ → ii)

    (16) *tjii*   (Langlois, 2004)
        ch**air**
        / tʃ**e**ː /

4.2 Schwa

The SAE shwa final, often orthographically represented as "-er, -or", reliably assimilates to *a*, as predicted by Coffin et al. (2022).

    (17) *tukuta*
        doct**or**
        / dɔkt**ə** /

    (18) *ama*
        hamm**er**
        / hæm**ə** /

Table 9 : Monophthongs

SAE source phoneme	Wangkatja target phoneme	Wangkatja loan	SAE source
/i:/	ii	*kii* *niila* *tii* *tjiipi*	k**ey** n**ee**dle t**ea** sh**ee**p
/ɪ/	i	raap**i**ta *natji* *nikirrpala*	rabb**i**t noth**i**ng nak**e**d fellow
/e/	/a/ /i/	*alpa* *mirritji*	h**e**lp m**e**dicine
/e:/	* ii		
/æ /	/a/ /aa/	*ama* *tampa* *kapu* *paka* *raapita*	h**a**mmer d**a**mper c**a**p b**a**cca r**a**bbit
/ɐ:/	/a/	*mutuka* *kilarrpa*	motor c**ar** gl**a**ss
/ɐ/	/a/	*kartapu* *natji*	c**u**t **u**p n**o**thing
/ɔ/	/u/ /u:/ /a/	*tukuta* *tuuka* *puurrpa* *(mama)katu*	d**o**ctor d**o**g b**o**ss g**o**d
/o:/	* uwa		
/ʊ/	/u/	*puluka*	b**u**llock
/ʉ:/	* uu or u		
/ɜ:/	/arr/ or /a/ /aa/	*warrka* *tjaata*	w**o**rk sh**ir**t
/ə/	/a/ /i/ /u/	*ama* *piipa* *tampa* *tukuta* *paka* *mitjitji* *puluka*	hamm**er** pap**er** damp**er** doct**or** bacc**a** miss**us** (white woman) bull**o**ck (cow)

4.3 Diphthongs

Table 11 : Diphthongs

SAE source phoneme	Wangkatja phoneme	Wangkatja loan	SAE source
/æɪ/	ii	*piipa*	p**a**per
	ayi	*tjayila*	j**ai**l
	i	*nikirrpala*	n**a**ked fellow
/ɑɪ/	a	*walypala*	wh**i**te fellow
/æɔ/	awu	*tawunpa*	t**ow**n
	awa	*tawatji*	tr**ou**sers
/əʉ/	u	*mutuka*	m**o**tor car
/ɪə/	* iya		
/ʊə/	* uwa		
/oɪ/	*uyi		

5.1 Addressing SAE consonant clusters

Words in SAE often have two or more consecutive consonants. Wangkatja phonotactics place constraints on sequences of consonants. As a direct consequence of Wangkatja syllable and word structure, consonant clusters are at most two consecutively and are only word medially. After an SAE phonemes are mapped to Wangkatja phonemes, as described earlier in this paper, if the resulting mappings result in unpermitted consonant clusters, speakers will respond by modifying the consonant clusters.

Consonant clusters in English may appear in three places: word-initially, word-medially and word-finally. Wangkatja syllable structure permits only one consonant word initially and word finally (if any), but consonant clusters are permitted word medially, subject to constraints.

1) Word initially
    glass
    / **gl**ɛːs /

2) Word medially
    do**ct**or
    / dɔ**kt**ə /

3) Word finally
    he**lp**
    / he**lp** /

The main strategies used are elision, epenthesis and segment modification, the first two being described by Coffin et al. (2022). Word medial consonant clusters are treated differently to word final and word initial consonant clusters.

Table 12: Medial Consonant Clusters in Wangkatja words

SAE word	Wangkatja word	SAE consonant cluster (phonetic)	Permissable by cluster constraints	Location in SAE word	Strategy
he**lp**	*alpa*	[ɭp]	yes	final	epenthesis
glass	kilarrpa	[gl]	no	initial	epenthesis
nee**dl**e	*niila*	[dɭ]	no	final	ellision
nake**d** **f**ellow	*nikirrpala*	[df]	no	medial	segment modification
bla**nk**et	*pilangkiti*	[ŋk]	yes	medial	retain
da**mp**er	*tampa*	[mp]	yes	medial	retain
do**ct**or	*tukuta*	[kt]	no	medial	epenthesis
whi**te** **f**ellow	*walypala*	[tf]	no	medial	segment modification
a**ppl**e	*yapulpa*	[pɭ]	no	final	epenthesis

5.2 Minimal modification

Word medial consonant clusters will at times not require much modification. After SAE phonemes are mapped to Wangkatja phonemes, the consonant cluster may not violate the consonant cluster rules in table 3. To illustrate this, referring to (19), the cluster /ŋk/ is a homorganic nasal-stop, which is a permissable consonant cluster.

(19) *pila**ngk**iti*
    blanket
    / blæ**ŋk**ɪt /

(20) *ta**mp**a*
    damper
    [dæ̃**mp**ə]

After mapping SAE phonemes to Wangkatja phonemes, if the resulting consonant cluster is not permissable (for example stop-stop), then speakers can modify the word using epenthesis, elision or segment modification. This is explored below.

5.2 Elision

Elision has been observed word initially and word finally.
In (13), the cluster [dl̥] is word final, hence to satisfy the syllable structure, [d] is dropped. In (14), the cluster [tɹ̥] is word initial, hence to satisfy the syllable structure, [ɹ̥] is dropped.

(21) *niila*
    nee**dl**e
    [niː**dl̥**]

(22) *tawatji*
    trousers
    [**tɹ̥**æɔzəz̥]

5.3 Epenthesis

Epenthesis has been observed in all positions. Like in 5.2, epenthesis is a strategy to avoid consonant clusters when they are not permitted by inter-syllabic cluster constraints. The vowel quality of the short vowel is not predictable and it appears that any short vowel (a, i, u) may be used as demonstrated in (23), (24) and (25).

(23) **kil**arrpa
    glass
    / **gl**ɛːs /

(24) a**lp**a
    help
    / he**lp** /

(25) tu**kut**a
    do**ct**or
    / dɔ**kt**ə /

In section 5.2 (22), the SAE consonant cluster 'tr' was modified using elision (dropping 'r'). In the closely related Ngaanyatjarra, similar word initial consonant clusters may be modified by different strategies. In (26), the SAE 'r' is dropped, whereas in (27) the SAE 'r' is retained and the consonant cluster is modified by epenthesis (inserting *u).* This may show that either strategy can be used, even in very similar phonological environments.

Ngaanyatjarra
(26) **ta**wurrtji   (Glass & Hackett, 2003)
    trousers
    [**tɹ̥**æɔzəz̥]

Ngaanyatjarra
>   (27) **tur**irrpa   (Glass, 1997)
>   **dr**ess
>   /**dɹ**es/

5.4 Segment Modification

When there is a word medial consonant cluster in SAE, at times instead of epenthesis (inserting a short vowel) or elision (dropping a consonant), the first consonant sometimes changes manner or place of articulation.

In (28), after applying phonological filtering, typically the SAE consonant cluster [df] maps to *tp*. This results in a stop-stop sequence which is not permitted. Referring to table 3, the trill *rr* may come before *p* (or any other consonant) and choosing *rr* also preserves the place of articulation (alveolar).

In (29), after applying phonological filtering, typically the SAE consonant cluster [tf] maps to *'tp'*. For the same reasons as in (16), *tp* is not a permitted cluster. Referring to table 3, any lateral (l, rl, ly) is permitted before a stop inter-syllabically.

>   (28) *niki**rrp**ala*
>   nake**d f**ellow
>   / næɪkɪ**df**elə /

>   (29) *wa**lyp**ala*
>   whi**te f**ellow
>   / wɑɪ**tf**elə /

5.4 Addressing SAE final consonants

Final consonants in English words are ubiquitous, whereas Wangkatja appears to have a strong preference vowel final syllables. This is a feature in other Western Desert languages such as Pitjantjatjarra and Yankunytjatjarra (Butcher & Tabain, 2014, Goddard, 1983). Where consonant final segments are allowed, the emphatic/euphonic morpheme –*pa* is typically added. It follows that when an SAE word is consonant final, Wangkatja words respond by deletion of final segments (elision) or appending a short vowel (epenthesis).

Deletion
>   (30) *tawaţji*
>   trouser**s**
>   [ţæɔzə**z̺**]

'Trousers' has two /z/ segments which are predicted to be mapped to *tj*. However, it is observed that the second segment has been deleted. This is one way that phonotactic rules are obeyed, as only nasals, laterals and trill consonants are found word finally in Wangkatja words. Deletion does not appear to be the preferred way, as in some cases deleting segments causes loss of information (Uffmann, 2013).

Epenthesis

    (31) *pilangkit**i***
       blanket
       / blæŋkɪt /

    (32) *tuuk**a***
       dog
       / dɔg /

Examples (31) and (32) demonstrate how Wangkatja appends short vowels to avoid word final consonants, especially when they are neither lateral, nasal nor trill. This leads to the question: what is the vowel quality of the final vowel? Is there any way to predict what the final epenthetic vowel will be? To answer this question, an analysis of language internal patterns is necessary. Out of the 18 loan words identified ending with a consonant in SAE, some general trends were found. These trends should be treated with caution as it is entirely possible that another SAE loan may be identified in the future that defies these trends.

[2]Penultimate syllable weight seems to be an important factor in influencing the quality of the final vowel. A heavy syllable is a syllable with two or more morae in this analysis, that is to say, there may be a long vowel (VV), a short vowel and consonant (VC) or a long vowel and consonant (VVC) in the syllable rime. A light syllable here is just a single short vowel (V).

Table 12: Heavy versus light penultimate syllables in consonant final SAE words

Syllable class 1: Light penultimate syllable (1 mora)	Syllable class 2: Heavy penultimate syllables (2 > morae)
raapita	*niila*
tjayila	*tuuka*
tjayil	*tjaata*
puluka	*warrka*
alpa	
	kilarrpa
kapu	*niilpa*
mamakatu	*buurrpa*
kartapu	*tawunpa*
	yapulpa
pilangkiti	*mirritjinpa*
piki-piki	
mitjitji	*tjiipi*

Class 2 syllables pattern in two ways, taking either *–a* or *–pa*. The trend governing *–a* or *–pa* is below:

Oral stops (*t, p, tj, k, rt*) tend to take *–a*.

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[2] I thank my colleague Joshua van de Ven for pointing this out.

Laterals, trills and nasals tend to take *–pa* (but may take *–a* or /ø/).
The inclusion of variants for *tjayila/tjayil* jail and *niila/niilpa* needle in Toolbox suggest that a number of endings is possible for a single lexeme. *Tjiipi* sheep appears to defy this trend, so it is labelled as an exception.

5.5 Language Internal Filtering vs Interlinguistic Borrowing

The development of Wangkatja appears to be heavily influenced in many aspects by various dialects of Ngaanyatjarra and Pitjantjatjarra. Comparison with wordlists from these languages was conducted. Comparison was also made with Cundeelee Wangka which has had similar linguistic influences as a mission language, particularly with Pitjantjatjarra (Hadfield, 2022).

Table 13: Similarity of loan words in Ngaanyatjarra, Pitjantjatjarra and Cundeelee Wangka compared to Wangkatja loans in the Wangkatja Toolbox

	Ngaanyatjarra (%)	Pitjantjatjarra (%)	Cundeelee Wangka (%)
Strict	58	32	58
Similar	74	50	79

With such high similarity between loan words in Ngaanyatjarra and Pitjantjatjarra, and also considering the migration and cultural connection that Mount Margaret residents historically had with speakers of those languages, lexical borrowing could have occurred from both contact with English in the missions as well as through contact with Ngaanyatjarra, Pitjantjatjarra and other traditional languages. Cundeelee Wangka also has very similar loan words to Wangkatja in those words which were analysed. This could be due to contact with residents travelling to and from Cundeelee, or due to Pitjantjatjarra influence on Cundeelee Wangka (Hanson, personal communication).

7 Implications for using an SAE to Wangkatja analysis and decolonising language revitalisation

In this paper, borrowing from English to Wangkatja has been analysed, rules for mapping sounds from English to Wangkatja have been suggested, and processes for respecting phonotactic constraints have been explored. The model which is assumed to be in operation is one where phones or phonemes from SAE undergo phonological filtering, as specified by Wangkatja phonology, which outputs words that obey Wangkatja phonology. This model abstracts away some of the complexity related to how lexical borrowings have found themselves in the language. This is referred to in this paper as the simple model for lexical borrowing in Wangkatja.

**Figure 3: Simple model of lexical borrowing in Wangkatja**
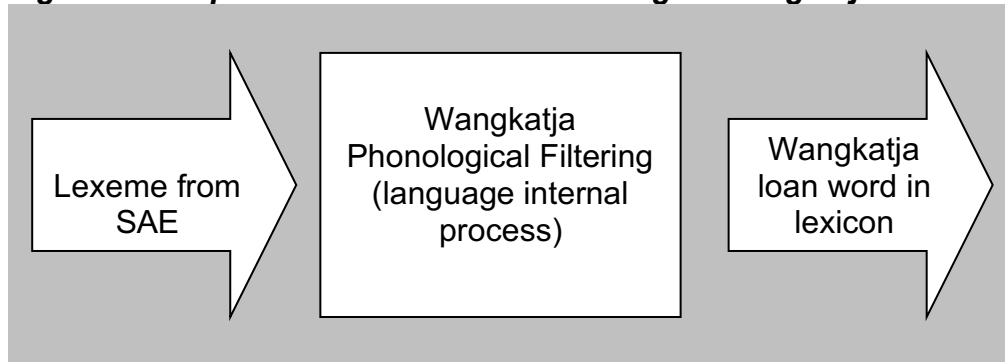
This model assumes that:
1. The only contact that occurred was between speakers of Wangkatja and English,
2. All English speakers who were involved in contact with Wangkatja spoke in a similar way with uniform, modern pronunciation (all speakers have the same "accent"),
3. There was no contact with English spoken by Aboriginal people.

This simple model, while being able to answer the question how can English words be transformed into words which sound acceptable to Wangkatja speakers, does not address issues such as one English phoneme mapping to several Wangkatja phonemes (with no contrastive environment identified). It does not recognise that English in Australia varies regionally by phonology, vocabulary and sociological background, nor does it recognise that speakers of English in the mission era likely came from different English speaking backgrounds. Based on anthropological accounts and what is known about the development of Wangkatja as a mission language, the simple model can be modified slightly to include more sources of English beyond modern SAE. This is illustrated below.

Figure 4: Historically informed model of lexical borrowing in Wangkatja
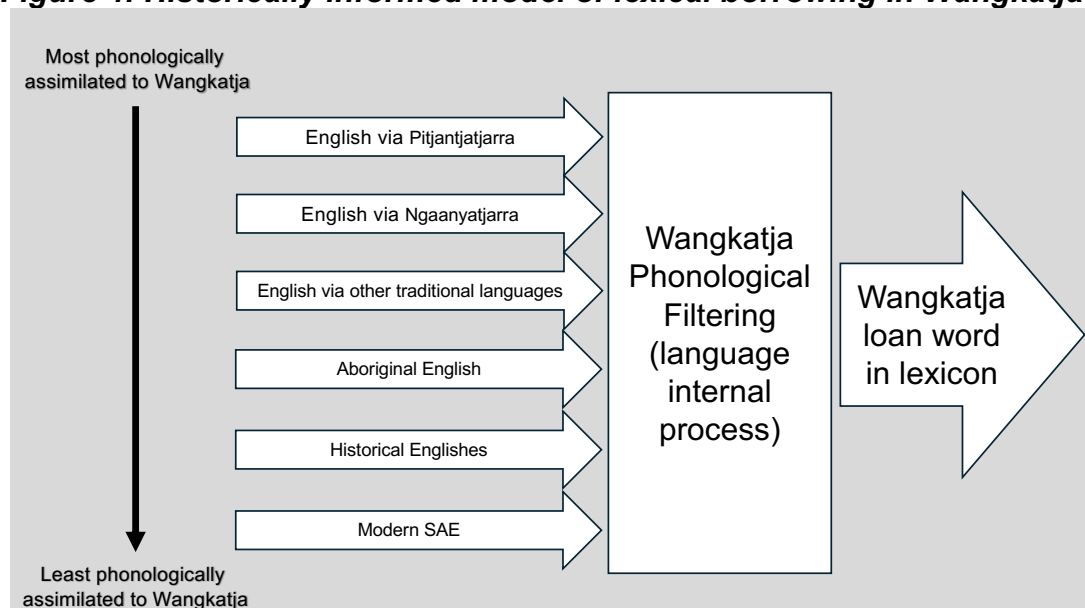
The historically informed model recognises that:

1. Aboriginal people who came to Mount Margaret Mission during the mission era were speakers of traditional languages such as Pitjantjatjarra, Ngaanyatjarra and other languages. These languages may have already had English words assimilated into the language lexicon. This reflects the fact that Aboriginal people were, and are still traditionally multilingual and using words from other traditional languages was commonplace (Vaughan, 2023).
2. Aboriginal people who came to the mission were taught English and discouraged from speaking traditional languages (Coffin, 2023).
3. Wangkatja speakers are likely to also be speakers of Aboriginal English.
4. Wangkatja speakers have interacted with SAE through the mission system and wider Western society.
5. English varies regionally and across time.

By acknowledging that the context of lexical borrowing is complex and not just a case of Wangkatja assimilating English words from SAE, but rather that lexical borrowing can occur in a number of ways, it gives speakers agency to decide the source of lexical borrowing, whether it be from:

1. English lexical borrowing in other traditional languages
2. Aboriginal English
3. Historical Englishes
4. Standard Australian English

Standard Australian English (SAE) is an abstraction for one particular variety of English spoken contemporarily in Australia and its use in the analysis outlined in this paper is for simplicity. The journey that words of English origin may take into Wangkatja may not be straightforward. To illustrate a point, one word may be from contact with speakers of historical Irish English, another word from Aboriginal English and another word borrowed indirectly through Pitjantjatjarra. In each of these cases, the word may have been minimally assimilated (in the case of Irish English), moderately assimilated (in the case of Aboriginal English) or heavily assimilated (in the case of Pitjantjatjarra) before being adopted into Wangkatja. In cases where assimilation is not necessary and the word already fits the phonological patterning of Wangkatja, Wangkatja speakers would not need to apply any phonological filtering of foreign phonemes and in this paper they have been referred to as "frozen forms". The frozen forms may not be subjected to the language internal phonological filtering rules. This may explain some of the variation in Wangkatja loan phonology.

8 Conclusion

This paper has explored Wangkatja loan phonology of words of SAE origin. The need to look at SAE phonemes has been stressed, but also consideration must be given to how SAE words may be produced in faster, connected speech as SAE words can sound quite different when not pronounced in careful speech, and this appears to have resulted in variation in some of the lexical borrowings. Furthermore, two different models of lexical borrowing have been proposed: the simple model and the historically informed model. The findings in this paper relate language rejuvenation of GALCAC languages and will assist in

repopulating and updating the Wangkatja lexicon through lexical borrowing, among other strategies identified by Coffin et al. (2022).

Appendix

Table 14: Comparison of Wangkatja loans to loans in Ngaanyatjarra, Pitjantjatjarra and Cundeelee Wangka

Very similar	Similar	Not similar/not available

Wangkatja word	Loan from SAE	Definition	Ngaanyatjarra	Pitjantjatjarra	Cundelee Wangka
alpa-	to help	help		*alpamilarni*	*alpa*
ama	hammer	hammer			*ama*
kapu	cap	hat			*kapu*
karrila-	to carry	bring			
kartapu-	to cut up	cut			*kartapu*
kii	key	key	*kii*	*kii*	*kii*
kilarrpa	glass	glass	*kilarrpa*		
mamakatu	god	father god			*katunya*
mirritjinpa	medicine	medicine	*mirrijinpa*	*mirritjina*	*mitijinpa*
mitjitji	missus	white woman	*mitjitji*		*mitjitji*
mitjitjin	medicine	medicine	*mirrijin(pa)*	*mirritjina*	*mitijinpa*
mutuka	motor car	car	*mutuka*	*mutuka*	*mutuka*
natji	nothing	nothing/don't			
niila	needle	pointed tool	*niilpa*		*niil*
niilpa	needle	pointed tool	*niilpa*		*niil*
nikirrpala	naked fellow	naked	*nikirrpala, nikirrpalya*		*nikirrpala*
paka	tobacco	tobacco	*paka*	*paka*	*paka*
piipa	paper	paper			*piipa*
pilangkiti	blanket	blanket	*pilangkati/pulangkiti*	*pulangkita*	*pilangkiti*
puluka	bullock	bullock	*puluka*	*puluka*	*puluka*
purni	pony	horse	*purni*		*purni*
puurrpa	boss	boss	*puurrpa*		*puurrpa*
raapita	rabbit	rabbit	*raapita*	*rapita*	*rapita*
tampa	damper	damper	*tampa*	*tampa*	*tampa*
tawatji	trousers	trousers	*tawurrtji*	*tarawatja*	*tawatji*
tawunpa	town	town	*tawun(pa)*		*tawunpa*
taya(ngka)	tyre	tyre	*taya*		*tayiya*
tii	tea	tea	*tii*	*tii*	*tii*
tjaata	shirt	shirt	*tjaarn(pa)*	*tjaata*	
tjayil	jail	jail	*tjayil(pa)*		*tjayil*
tjayila	jail	jail	*tjayil(pa)*		*tjayil*
tjiipi	sheep	sheep	*tjiipu*	*tjiipi*	*tjiipi*
tukuta	doctor	doctor	*tukuta*	*takata*	*tukata*
tuuka	dog	fox	*tuuka*	*tuuka*	
walypala	white fellow	white person	*walypala*	*walypala*	
warrka	work	work	*waarka*	*warrka*	*waaka*
waya	wire	crowbar	*waya*		*waya*
yapulpa	apple	apple	*yapulpa*	*apula*	*yapulpa*

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