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Advances in mixed language phonology: An overview of three case studies

1 Introduction

Mixed languages have provided a fascinating platform for linguistic inquiry for the better part of four decades when initial works began to appear in the literature. From the 1990s to approximately the mid-2000s, interest in the mixed language debate peaked with a number of influential publications that aspired to make sense of this rare linguistic phenomenon. This research laid the foundation for numerous theoretical, empirical, and descriptive works that continue to refine what it means to be a "mixed language" and the importance of these languages in understanding language contact and language genesis. Nearly all studies involving inquiries into mixed languages centre on theoretical, empirical, or descriptive accounts of higher-level phenomena involving the mixing of lexicon, morphosyntax, semantics, in addition to socio-cultural phenomena that give rise to such extreme language mixing. However, beyond basic descriptions based primarily on impressionistic observations, one area of mixed language research that has been largely overlooked is that of phonology, and of greater theoretical interest, the phonetic repercussions of amalgamating two or more sound systems into a single language.

Mixed languages are unlike creoles and other forms of language contact in that they are created for expressive purposes rather than out of communicative need. This is because the originators of mixed languages are already proficient bilinguals in the source languages. This fact raises a number of questions regarding how phonological material is arranged in the mixed language as the originators likely had some degree of proficiency in both source sound systems; unlike the originators of creole languages who are often only proficient in one. This chapter provides a synopsis of the advances in mixed language phonology over the last decade based on three case studies involving Media Lengua, Gurindji Kriol, and Michif that have used empirical research involving acoustic measurements and psycholinguistic perception experiments.

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1.1 Conflict sites

Investigating mixed language phonology, or the phonology of any contact language, begins with identifying *phonemic conflict sites* in the source languages' sound inventories. *Conflict sites* are areas of convergence in the grammars of two or more language varieties in contact where two or more forms compete to express a particular function. The identification of conflict sites is a useful diagnostic tool for determining the source grammar of code-switching vocabulary, lexical borrowings, structural gaps from incomplete or "unguided" L2 acquisition and areas of grammatical convergence (see e.g., Poplack 1993; Rosen 2007; Smith-Christmas et. al 2013). While conflict sites are commonly used to identify areas of convergence in the morphosyntax of contact grammars, phonemic conflict sites (i.e., areas of phonological convergence where two or more sounds compete for a position in the phoneme inventory of a language) provide the basis for identifying how a sound system in a contact grammar is formed. For example, if the ancestral language,[1] which makes up the bulk of a mixed language's phonology, contains phonemes /a, i, u/ and the introduced language contains phonemes /a, i, e, u, o/, /e/ and /o/ are considered phonemic conflict sites as speakers must decide what happens with these sounds (e.g., they could undergo assimilation to vowels of a similar quality or enter in the language as new phonemes). In fact, phonemic conflict sites make up the foundation of every comparative phonetic analysis in the mixed language literature to date, whether they are identified as such or not (see e.g., Rosen 2006, 2007; Jones, Meakins, and Buchan 2011; Buchan 2012; Jones, Meakins, and Mauwiyath 2012; Jones and Meakins 2013; Stewart 2014, 2015a, 2015b, 2018a, 2018b, 2020; Rosen, Stewart, and Sammons 2020; Stewart et. al 2018; Rosen et. al 2019; Stewart et. al. 2020). The following sections present phonological processes involved in "conventional" lexical borrowings (section 1.2), traditional descriptions and theoretical accounts of mixed language phonology (section 1.3), and empirical evidence of mixed language phonology using acoustic and perceptual data (section 1.4).

1 The terms "ancestral" and "introduced" are used in a chronological sense with the former referring to the original homeland language (i.e., pre-contact), while the latter is the language introduced to this group, either through trade, colonization, or their own migration (i.e., post-contact).

1.2 “Conventional” contact language phonology

There is a large body of literature that describes what happens when two or more languages or dialects come into contact. As a group, contact languages typically exhibit similar types of changes; however, the degree of change can vary considerably. It has been shown that when contact takes place, extra-linguistic factors place one language variety in a more socially prestigious position over the other(s). In most cases the “introduced” language takes this position and has an unidirectional influence on the “ancestral” language (Fought 2010; Hickey 2010).

Cross-linguistically, linguistic elements show different degrees of susceptibility to transfer, for example nouns are borrowed more often than verbs and derivational morphology transfers more readily than inflectional morphology (Thomason 2010). However, one domain which is most often resistant to transfer is phonology. Under typical conditions, loanwords conform to the phonological constraints of the recipient language. This adaptation can affect a loanword at all levels of phonology (segmental, phonotactic, suprasegmental, morphophonological etc.) (Kang 2011). Because of their phonological assimilation, loanwords often become indistinguishable from the native lexicon (e.g., English speakers often pronounce ‘karaoke’ as [ˌkʰæ˞ɹiːˈo͜ʊkʲiː] and not as [ka̠ɾa̠o̞ke̞] in Japanese, its language of origin) (Winford 2010). However, as the contact situation intensifies and learning becomes more “guided”, phonological and phonetic features may also transfer from loanwords to the source language (e.g., Ossetic native vocabulary containing borrowed ejectives from neighbouring Caucasian languages) (Thomason 2010: 42). In very intense contact situations, sounds from the source language may even be borrowed into the recipient language’s native vocabulary (Thomason 2010).

1.3 Traditional descriptions of mixed language phonology

Traditional phonological analyses and theoretical accounts of mixed languages claim that their phonological structure can be reasonably predicted based on how the language is arranged morphosyntactically. Such analyses essentially predict two possible outcomes where speakers of the mixed language either (1) adopt the phonology of the ancestral language or (2) preserve the phonologies of each source language (i.e., stratification). In the past, researchers have often tied the phonological outcome of mixed languages with their structural make up, which consist of three fundamental types (Bakker 2015; Meakins 2016; Meakins and Stewart accepted):

1) L(exical)-G(rammar) mixed languages
2) Converted languages
3) V(erb)-N(oun) mixed languages

In the first group, LG mixed languages, including Angloromani (see e.g., Hancock 1976, 1984; Matras, Gardner, Jones, and Schulmann 2007), Media Lengua (see e.g., Muysken 1981, 1997; Gómez-Rendón 2005) and Ma'á (see e.g., Mous 2003a, 2003b), phonology has been considered to be part of the grammatical system. This is based on the phonological regularization of lexical items from language A to that of the grammatical source language B (Bakker 2003). Therefore, the Spanish lexicon in Media Lengua would sound like that of Quichua (e.g., Media Lengua word of Spanish origin: *kiri-* [ˈkiɾi] 'want' vs. Spanish: *quere-* [keˈɾe] 'want'; Media Lengua word of Quichua origin (also borrowed in Spanish): *lluchu* [ʒuʧu] vs. Quichua: *lluchu* [ʒuʧu] vs. Spanish: *llucho* [ʎuʧo] 'naked'), and the Romani lexicon in Angloromani would sound like English.

The second group of mixed languages, known as converted languages, is categorised based on radical changes to its typology while maintaining its native vocabulary (Bakker 2003). Such typological changes are driven by the process of metatypy where the morphosyntax of language X in a bilingual speech community is restructured based on the morphosyntax of language Y (i.e., a type of extreme grammatical calquing) but the forms of the language essentially remain the same (Ross 2007). Little has been written about the phonological outcomes of these languages. However, for Modern Sri Lankan Portuguese (MSLP), Smith (1978) mentions that the vowel system is of Portuguese origin regarding number and place of articulation, yet the nasal contrast found in Portuguese had been eliminated in favour of the length contrast found in Tamil (e.g., /ẽ/ → /eː/).

The third group consists of V-N mixed languages such as Michif (see Bakker 1997), Mednyj Aleut (see Golovko 1990), and Gurindji Kriol (see Meakins 2011). Instead of showing a clear division between lexicon and grammar, these languages show splits between lexical and grammatical categories in the noun and verb systems. Unlike the phonological systems of the previous groups, both Michif and Mednyj Aleut are often analysed as having two "co-existing" phonologies. In the case of Michif, French phonology applies to French origin elements and Cree phonology applies to Cree origin elements (e.g., Michif of French origin: *li grañ* [ləgʁæ̃] vs. French: *le gran* [ləgʁæ̃] 'the big'; Michif of Cree origin: *shooshkwaaw* [ʃoːʃkwaːw] vs. Cree *sôskwâw* [soːskwaːw] 'it's slippery') (Rhodes 1986; Bakker 1997; Bakker and Papen 1997). Rosen (2007), however provided a synchronic description of the Michif phonological system suggesting that it was unnecessary to focus on the source languages to accurately describe its underlying structure. Regarding Mednyj Aleut, Russian borrowings maintain Russian phonology while the rest of the language maintains an Aleut phonological structure (Thomason 1997). Similarly, in Gurindji Kriol, words from Gurindji maintain a three-vowel contrast whereas words from Kriol (an English derived creole) maintain a five-vowel contrast (Jones, Meakins, and Mauwiyath 2012).

Van Gijn's (2009) analysis, based on descriptions of Media Lengua, Callahuaya, Mednyj Aleut, and Michif, concludes that the phonology of a mixed language can be predicted based on the unmixed phonological domains and where they appear on the prosodic hierarchy (see Nespor and Vogel 1986). Therefore, mixed languages with an agglutinating structure such as Media Lengua would conform to the phonology of the ancestral language, which provides the grammar, as the vast majority of words in the language contain elements from both languages (e.g., Spanish stems and Quichua suffixes). However, Michif, formed from a polysynthetic language (Plains Cree) and a fusional language (Métis French), contains a greater number of "unmixed" words because verb phrases (mainly of Plains Cree origin) remain separated from noun phrases (mainly of French origin). As such, van Gijn claims that French phonological rules can be applied to French origin noun phrases (NP) and Cree phonological rules can be applied to Cree origin verb phrases (VP).

Turning to the prosodic hierarchy, van Gijn explains that since Media Lengua and Michif contain elements from both source languages at higher prosodic levels (e.g., the intonational phrase and above) suprasegmental material should be identifiable from both languages. However, at the mid-levels of the prosodic hierarchy (e.g., the phonological phrase and prosodic word), he suggests that Media Lengua should conform to Quichua phonology since the language still shares elements at these levels. In contrast, Michif would still be considered "divided" (e.g., NPs and VPs are nearly always separate prosodic words). Finally at the lower levels (e.g., syllable and foot[2]), van Gijn suggests that both Media Lengua (also see Muysken 2013) and Michif should be stratified phonologically.

1.4 Empirical studies involving mixed language phonology

While van Gijn's (2009) analysis reflects various impressionistic aspects of the surface-level phonologies of mixed languages, it falls short at predicting the actual phonetic production and perceptual realities of these languages. From a phonetic stand point, mixed language phonology is a complex arrangement of the source language phonologies. Analyses of Media Lengua (Stewart 2014, 2015a,

2 Van Gijn does not include the foot level in his analysis though Muysken (2013) does.

2015b, 2018b, 2019), Gurindji Kriol (Jones, Meakins and Mauwiyath 2011, 2012; Buchan 2012; Jones and Meakins 2013; Stewart et al. 2018, Stewart, Meakins, Algy, Ennever, and Joshua, 2020), and Michif (Rosen, 2006, 2007; Rosen et al., 2020; Rosen et al. 2019) suggest that there exists a propensity for phonological material to assimilate to the phonology of the ancestral language (e.g., Quichua for Media Lengua, Gurindji for Gurindji Kriol, and Cree for Michif). In other words, the language, which was acquired originally as an L2 (the introduced language) essentially conforms to the L1 phonological system of the ancestral language in much the same way a mid to late bilingual[3] might acquire the phonology of their L2.

At the same time, the introduced language appears to feed in phonological aspects that appear beneficial for maintaining contrasts. However, the arrangements of the source phonologies do not always conform to traditional notions of adaptive dispersion models which predict that when a new category is established, crowding of the phonetic space occurs causing dispersion in order to maintain contrasts (Liljencrants and Lindblom 1972; Lindblom 1986, 1990; Johnson 2000; Livijn 2000; Flege 2007). Instead we observe near-mergers, overlapping categories, categorical assimilation, categorical maintenance, and overshoot of target categories at the segmental level, in addition to prosodic assimilation, possible preservations of archaic patterns, and innovation at the suprasegmental level.

It should also be noted that the three mixed languages discussed below have some striking similarities across their phoneme inventories. In each case, the ancestral language (Quichua, Gurindji, & Cree) has a comparatively small vowel inventory and the stop series contains no voicing contrast (voiceless stops only). In contrast, the introduced languages (Spanish, Kriol, and French) have larger vowel inventories and voicing contrasts in their stop series. Given these similarities across each language and the number of studies conducted on vowels and stops in these mixed languages, we have the benefit of a number of cross-linguistic comparisons, which will be discussed in section 2. The following sections present case studies involving Media Lengua (section 2.1), Gurindji Kriol (section 2.2), and Michif (section 2.3).

3 Guion (2003: 106) defines a mid bilingual as a person who acquires their L2 between the ages of 9–13 and a late bilingual after the age of 15.

2 Case studies

2.1 Media Lengua

Media Lengua (ISO 639-3: mue) is a LG mixed language with an extraordinary ~~high~~ degree of relexification, surpassing 90% in the Imbabura dialect (see 1). The primary lexical basis for Media Lengua is Rural Andean Ecuadorian Spanish while the primary grammatical basis is Imbabura Quichua spoken in the southern region of Lago San Pablo. Media Lengua, like Quichua, is an agglutinating SOV language with highly regular morphology. In 1, the bolded elements in the IPA transcription are of Spanish origin while those in normal font are of Quichua origin. Translations in Rural Spanish and Quichua are provided for comparison.

(1) *Yoca esperashami breve volvimungui.*
jo-ka **espera**-ʃa-mi **bɾeβe** **bolβi**-mu-ngi
1-TOP wait-FUT-VAL quickly return-TRANS-2
'Yo te esperaré, vuelve breve.' (Rural Spanish)
'Ñukaca shuyashami utiya tigramungui.' (Quichua)
'I'll wait for you, come back quickly.'
(Consultant #50)

2.1.1 Source language inventories

The Native Imbabura Quichua phoneme inventory is made up of 18 consonants (Table 1) and 3 vowels (Figure 1). Rural Andean Spanish spoken in Ecuador contains 19 consonants (Table 2) and 5 vowels (Figure 2). Comparing the phoneme inventories from both languages, 12 possible phonemic conflict sites can be identified; 5 from Quichua (/h, ʐ, ʒ, ʃ, ɸ/) and 7 (/b, d, g, e, o, r, ʎ/) from Spanish. To date, all 7 conflict sites from Spanish have been analysed using quantitative methods.

2.1.1.1 Quichua

Imbabura Quichua differs from other Quechuan dialects in that it has collapsed a number of sounds into /ʒ/; most notably the lateral approximant /ʎ/, and the voicing of /ʦ/ in post-nasal positions (Cole 1982; Toapanta and Haboud 2012; Stewart 2019). Moreover, there is little evidence of an aspirated stop series in Imbabura Quichua and ejective stops and uvular stops are not

Table 1: Consonant inventory for Imbabura Quichua.

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Glottal
Plosive	p		t̪					k	
Nasal	m		n				ɲ		
Tap				ɾ					
Fricative		f		s	ʃ ʒ	ʐ		x	h
Affricate				ʧ					
Approximant							j		w
Lateral Approximant				l					

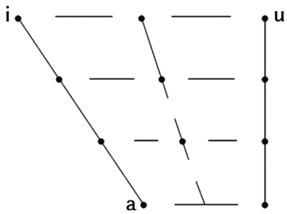

Figure 1: Vowel inventory for Imbabura Quichua.

Table 2: Consonant inventory for Rural Andean Spanish spoken in Ecuador.

	Bilabial	Dental	Alveolar	Postalveolar	Palatal	Velar
Plosive	p b	t̪ d̪				k g
Nasal	m	n			ɲ	
Trill			r			
Tap			ɾ			
Fricative	ɸ		s	ʃ*		x
Affricate			ʧ			
Approximant					j	w
Lateral Approximant			l		ʎ	

*non-native Spanish words.

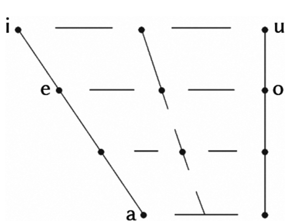

Figure 2: Vowel inventory for Rural Andean Spanish spoken in Ecuador.

found in Ecuadorian dialects of Quichua. Any sound that might resemble a trill [r/ʀ] in other dialects is pronounced as a voiced retroflex [ʐ] in Imbabura as well (e.g., *arrarray* ‘it’s so hot!’).

The native vowel system of Imbabura Quichua consists of three corner vowels (/i, u, a/), which are sometimes described as /ɪ, ʊ, a/ (see e.g., Guion 2003). Unlike other Quechuan dialects, Ecuadorian Quichua does not contain the allophonic rule that lowers the high vowels to [e] and [o] when preceded by a uvular consonant (/q/) (e.g., Cuzco [kuz**qo**]) (Adelaar and Muysken 2004: 196).

2.1.1.2 Spanish

Spanish spoken throughout Ecuador varies greatly with a large number of regional dialects and sociolects spoken throughout the country. Those in the Andean region show some degree of convergence with Quichua while those on the coast (Equatorial dialects) reflect those of northern Peru and southern coastal Colombia (Boyd-Bowman 1953). For example, unlike other dialects of Spanish, speakers in Ecuador are able to identify differences between /ʧ/ vs. /ʃ/ as the latter has entered the language through a number of Quichua borrowings (e.g., *shungo* 'heart', *shunsho* 'silly/fool', *mashi* 'friend'). Table 2 provides the phoneme inventory for Andean Spanish; other similarities with Quichua will be discussed in section 3.

The vowels in Andean Spanish are typically analysed as a five-vowel system consisting of three corner vowels in addition to a mid-vowel series. However, empirical evidence from Guion (2003) shows that late L2 bilinguals (L1 Quichua) often raise the mid vowel series or collapse it entirely with the high vowels suggesting that the system functions with three vowels.

2.1.2 Obstruents

The stop voicing phonemic conflict site in Media Lengua (/p-b/, /t-d/, /k-g/ from Spanish & /p/, /t/, /k/ from Quichua) provides an example of complete integration of an introduced sound contrast into the phonology of a mixed language where the ancestral language had no such contrast. In a study on stop production in Media Lengua involving 2456 elicited tokens produced by 19 speakers (12 women/7 men) recorded in their homes, Stewart (2018a) showed that Media Lengua speakers consistently produce voiced stops in Spanish origin words with long negative voice onset times (VOT) that reflect those of L1 speakers of Rural Spanish (1,060 tokens from 6 women/ 4 men) in all three places of articulation (Figure 3, left). The VOT of voiced stops of Spanish origin in Quichua (1564 tokens from 12 women/8 men) were shown to be significantly longer than those produced in Media Lengua or Rural Spanish and a substantial number of tokens also underwent weakening (/b/ → [β] 28%; /d/ → [ð] 4%; /g/ → [ɣ] 47%), which was not seen to such a degree in the Media Lengua (/b/ → [β] 4%; /d/ → [ð] 0.5%; /g/ → [ɣ] 4%), though partially in Rural Spanish group (/b/ → [β] 9%; /d/ → [ð] 4%; /g/ → [ɣ] 46%) (see Stewart, 2015b). For the voiceless series, Media Lengua speakers showed non-significant differences with Quichua speakers and Rural Spanish speakers in the production of short-lag (unaspirated) VOT, with the except of Rural Spanish [k], which only differed by 7 ms (Figure 3, bottom right).

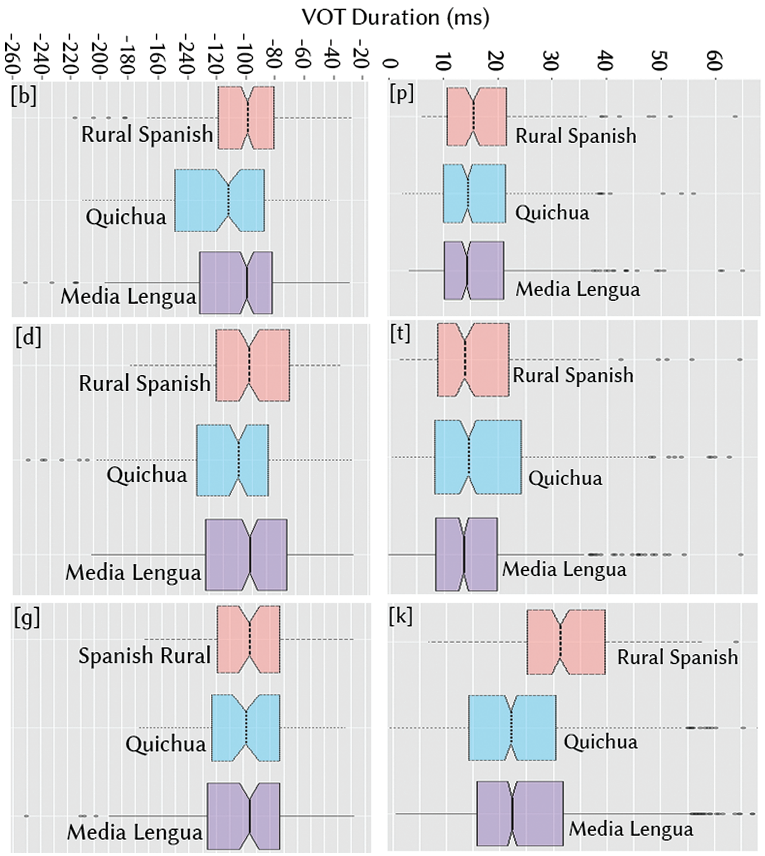

Figure 3: VOT comparisons for Media Lengua (solid, 9478C2) and Rural Spanish (dotted, FD8F86) voiced stops (left), and Media Lengua and Quichua (dotted, 5BCFF9) voiceless stops (right) based on Stewart (2018a).

To establish whether the production differences between voiced and voiceless stops play a functional role in the phonology as contrastive phonemes or whether Media Lengua speakers are simply assimilating Spanish-like voiced stops without considering categorical boundaries, Stewart (2015b) conducted a two alternative forced-choice (2AFC) identification task experiment with 10 participants. The experiment involved paired stimuli with gradually modified VOT durations of word-initial stops in minimal pairs across 10-step continua from a prototypical voiced stop to a prototypical voiceless stop (e.g., *peso-beso* 'weight-kiss', *tía-día* 'aunt-day'). Results from this experiment show that listeners identified significant differences in the voiced stops (Figure 4, step 1) from the voiceless

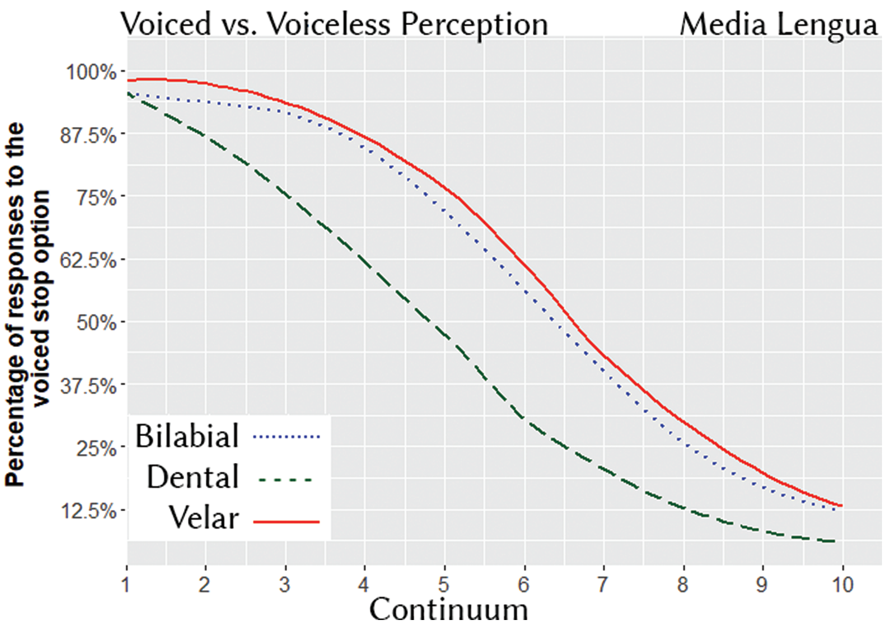

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Figure 4: 2AFC identification task results for Media Lengua listeners averaged across the 10-step continua for each place of articulation based on Stewart (2015b).

stop (Figure 4, step 10) with a high degree of consistency across all three places of articulation.[4] The combined results from these studies suggest that Media Lengua speakers have fully adapted the stop voicing contrast both productively and perceptually from Spanish lexical borrowings.

2.1.3 Liquids

Another phonemic conflict site in Media Lengua involves the Spanish liquid consonants /r/ (trill) and /ʎ/ (palatal lateral approximant). In a phonetic analysis of this conflicting area of phonological convergence, Stewart (2019) shows

4 Notice that the categorical boundaries (the 50% point) for all three places of articulation in Figure 4 fall at -20 ms (+/– 2 ms). For the velars this appears at step 5 and for the dentals and bilabials at step 7. The visual difference in the figure is simply a graphing effect caused by superimposing all three places of articulation together, which reveals the different VOT range of the velars compared to the dentals and bilabials. This difference in range is caused by aerodynamic effects that make positive VOTs longer in more retracted places of articulation.

that /r/ and /ʎ/ have direct, one to one correspondences with native Quichua fricatives /ʐ/ and /ʒ/, respectively. As such, the Spanish origin sounds in Spanish origin words have been completely replaced by their Quichua fricative counterparts in Media Lengua. This wholesale assimilation was observed in all 19 of the Media Lengua-speaking participants with ratios of 104:1 [ʒ: ʎ] and 129:0 [ʐ: r].[5] An example of /r/ → /ʐ/ can be observed in Figure 5 with a standard trill on the left, identified by the closure and aperture phases which create regions of low and high energy across the wave form and spectrogram, respectively, throughout the segment, and the voiced fricative on the right, identified by the unimpeded frication throughout the segment (see Stewart 2019 for more details on the acoustic correlates of these segments).

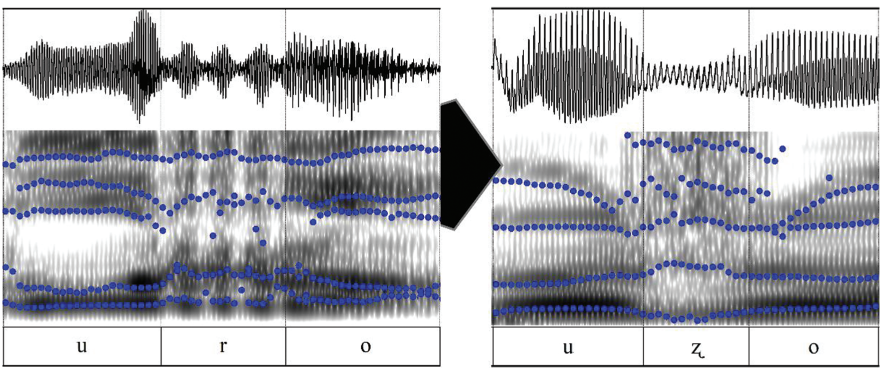

Figure 5: The standard Spanish trill produced in the word burro [ˈburo] 'donkey' (left) with 4 closure and 3 aperture phases vs. the standard Media Lengua retroflex fricative produced in the word burromi [buˈʐomi] 'donkey-VAL' (right).

An example of /ʎ/ → /ʒ/ is illustrated in Figure 6. In both images, the segment in question is flanked by approximants as the tongue is fronted from [o] towards the palate and postalveolar positions for the target segments before being once again retracted for the second [o]. One observable acoustic correlate that sets these sounds apart is the dispersion of the formant trajectories in the second half of the segment in Figure 6 (left), caused by lateral noise, whereas Figure 6 (right) has uninterrupted formant trajectories. Unlike the obstruent results, which showed a clear case of adoption by Media Lengua speakers, the Spanish origin liquids

5 Data gathered in this section was collected from the same participants during the same field sessions described in 2.1.2.

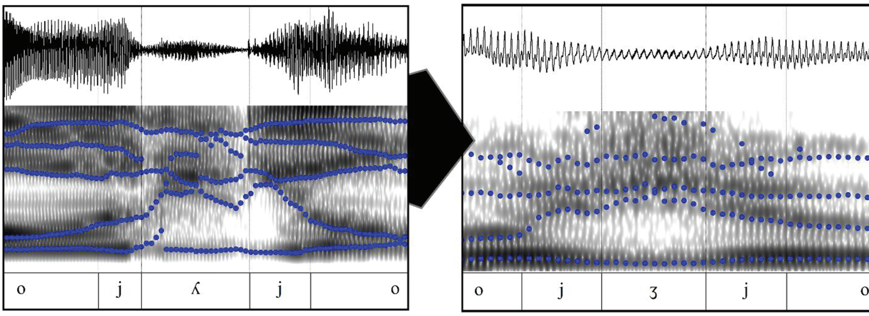

Figure 6: The Standard Spanish palatal lateral approximant produced in the word pollo [ˈpoʎo] ‘chicken’ vs. the standard Media Lengua postalveolar fricative produced in the word pollo [ˈpoʒo] ‘chicken’.

provide a clear case of introduced phonemes undergoing assimilation to sounds in the ancestral language’s phonology.

2.1.4 Vowels

The final phonemic conflict site discussed for Media Lengua, at the segmental level, involves its vowel system. In this case, Media Lengua speakers are confronted with two additional mid vowels (/e/ & /o/) entering the language through Spanish borrowings. For vowel production, Stewart (2014) describes a complex stratified system involving Media Lengua vowels based on their language of origin (Quichua & Spanish). This analysis involved F1 and F2 formant measurements from Quichua origin vowels (/i, u, a/) and Spanish origin vowels (/i, u, e, o, a/) from 2515 elicited tokens, recorded in the speakers’ homes, from 10 speakers (6 women/ 4 men). Results showed that Quichua-source and Spanish-source high and low vowels of the same quality (/i, a, u/) co-exist as near-mergers (covert contrasts) in Media Lengua, which are only distinguishable from each other based on minute variances uncovered in ~~his~~ statistical analysis (see Figure 7). Yet, the Spanish-source vowels disperse away from the Quichua-source vowels is such a way that reflects the directions predicted by models of adaptive dispersion (see Liljencrants and Lindblom 1972; Lindblom 1986, 1990; Johnson 2000; Livijn 2000) (i.e., Spanish-source corner vowels are ever so slightly lower in F1 frequency for the high vowels /i/ and /u/, and ever so slightly higher in F1 frequency for the low vowel /a/).

For the Spanish-source mid-vowels (/e, o/) and Spanish-source (and by proxy Quichua-source) high vowels (/i, u/), Stewart (2014) revealed both systems

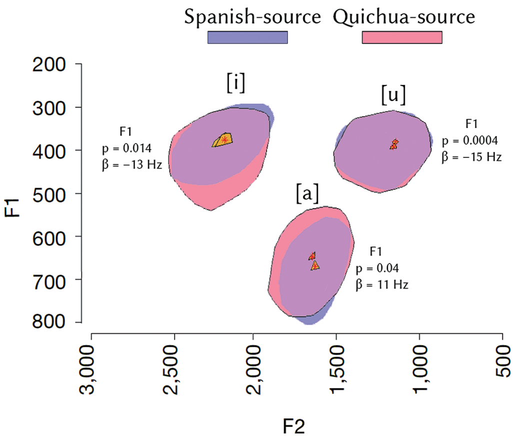

Figure 7: Fifty percent concentrations (large polygons) and averages (small centre polygons) of the overlapping Spanish-source (#9A9CFA) and Quichua-source (#FA9AAE) corner vowels in Media Lengua, based on Stewart (2014).

co-exist in Media Lengua with considerable overlap (see Figure 8). However, the differences in F1 frequency between the mid and high vowels were shown to be significant with an average distance of 41 Hz (0.36 Bark). This value falls just beyond the threshold of 0.3 Bark identified by Kewley (2001) for formant discrimination for formant values between 200 and 3000 Hz.

Based on this analysis, Stewart (2018b) asked whether Media Lengua listeners could aurally identify differences between mid- and high-vowels within these overlapping spaces. Similar to the experiment conducted by Stewart (2015b), a 2AFC identification task experiment was run with the same 10 participants but with the minimal pairs: *piso-peso* [ˈpi.so – ˈpe.so] ‘floor-weight’; *pipa-pepa* [ˈpi.pa – ˈpe.pa] ‘pipe-seed’; *lona-luna* [ˈlo.na – ˈlu.na] ‘tarp-moon’; *poma-puma* [ˈpo.ma – ˈpu.ma] ‘jug-puma’. Results from this experiment show that Media Lengua listeners identified significant differences between the mid vowels (Figure 9, step 1) and the high vowels (Figure 9, step 10) with a high degree of consistency across both the front and back series.[6]

6 Notice that the categorical boundaries (the 50% point) for both vowels in Figure 9 have an F1 average between 469 Hz and 452 Hz; a difference of only 17 Hz. For the front vowels, this appears between steps 3 and 4, while for the back vowels this appears at step 5. The visual difference in the figure is simply a graphing effect caused by superimposing both front and back vowels together.

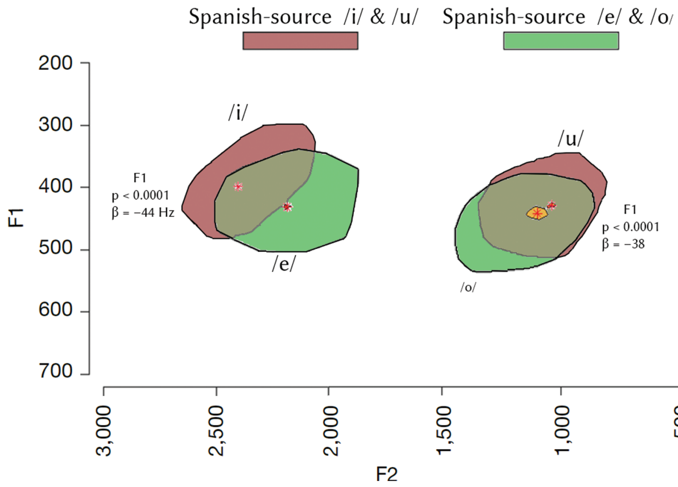

Figure 8: Fifty percent concentrations (large polygons) and averages (small centre polygons) of the overlapping Spanish-source high (#B97373) and Spanish-source mid (#79C87E) vowels in Media Lengua, based on Stewart (2014).

Media Lengua, unlike Gurindji Kriol and Michif is often described as a mixed language with few stratified elements at the phonological level (Muysken 1997; Gómez-Rendón 2005; van Gijn 2009). However, the results from these studies call into question such analyses since Media Lengua appears to have adopted specific sounds (the voiced stop series described in 2.1.2), assimilated others (the liquids to fricatives described in 2.1.3), and operates two vowel systems with considerable overlap (described in 2.1.4). The next section (2.1.5) briefly describes intonation in Media Lengua.

2.1.5 Suprasegmentals

Regarding prosodic features in Media Lengua, Stewart (2015a) provides a description of intonation patterns based on fundamental frequency (f0) contours. This analysis suggests that the vast majority reflect intonation patterns in Quichua (see Cole 1982) and other Quechuan languages (see O'Rourke 2007) and those that did not were argued to either be innovations or archaic patterns not found in present day Quichua dialects geographically close to where Media Lengua is spoken. Additionally, no patterns were identified that reflected Spanish-like prosody, that were not already shared with Quichua.

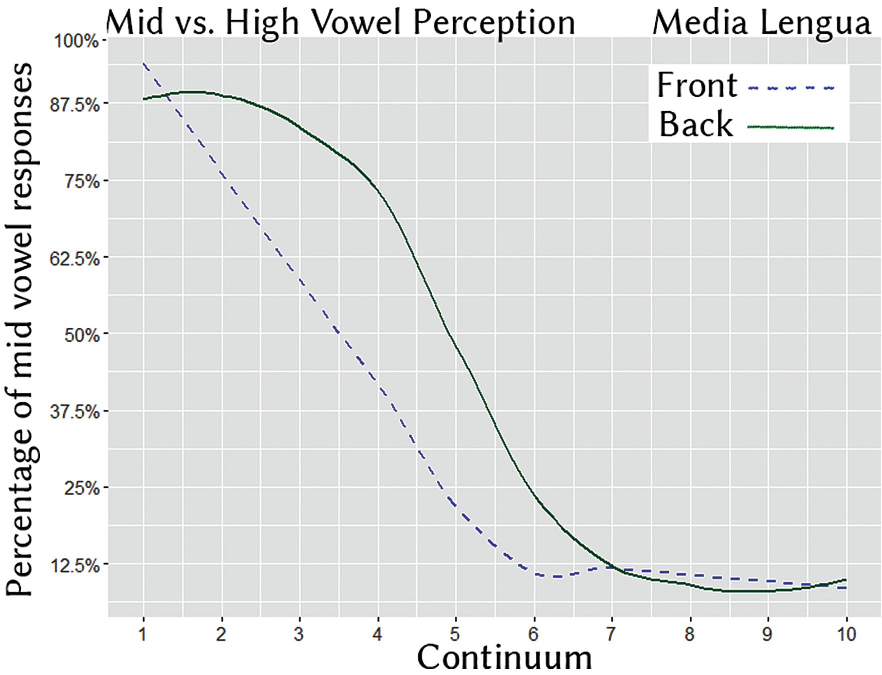

Figure 9: 2AFC identification task results for Media Lengua listeners averaged across the 10-step continua for the front (dashed) and back (solid) vowel series, based on Stewart (2018b).

2.2 Gurindji Kriol

Gurindji Kriol (ISO 639-3: gjr) is a V-N mixed language spoken in the Victoria River District of northern Australia. It emerged approximately 40 years ago through pervasive code-switching through intense contact between ~~speakers of~~ north Australian Kriol (an English-lexifier creole, Roper Kriol is the classic variety) and Gurindji (a Pama–Nyungan language). Gurindji Kriol is currently spoken by Gurindji people in the communities of Daguragu and Kalkaringi, and by Bilinarra and Ngarinyman people in two communities north of Kalkaringi – Pigeon Hole and Yarralin. Unlike Media Lengua, Gurindji Kriol originates in both lexical and structural borrowings from both source languages with Gurindji providing the bulk of nominal phrase elements and Kriol providing the bulk of the verbal phrase elements. The lexicon of Gurindji Kriol is also quite mixed with an approximate 1:3 split between Kriol origin lexicon, Gurindji origin lexicon, and synonymous forms from both source languages. In 2, the bolded elements in the second line are of Kriol origin while those in normal font are of Gurindji origin. Translations in Kriol and Gurindji are provided for comparison.

(2) *Dat warlakungku bin baitim dat marluka futta.*
dat waɽlaku-ŋgku **bin** **bait-im** **dat** maɽluka **fut**-ta
the dog-ERG PST bite-TR the old.man foot-LOC
'Dat dog bin baitim dat olman la fut.' (Kriol)
'Warlaku-lu katurl payarni marluka jamana-la.' (Gurindji)
'The dog bit the old man on the foot.'

2.2.1 Source language inventories

The Gurindji phoneme inventory is made up of 17 consonants (Table 3) and 3 vowels with a length distinction (Figure 1). Roper Kriol contains 29 consonants (Table 4) and 5 vowels with a length distinction (Figure 2). Comparing the phoneme inventories from both languages, 17 possible phonemic conflict sites can be identified; 1 from Gurindji (/c/) and 16 from Kriol (/b, t̪, d̪, d, ɖ, g, f, s, ʃ, h, ʧ, ʤ, e, o, eː, oː/). To date, 10 of these conflict sites have been analysed using empirical methods (/b, d, g, f, s, e, o, eː, oː, ʤ/).

2.2.1.1 Gurindji

Gurindji, like many other Australian languages, is limited in its number of manner of articulation contrasts in its obstruent inventory. However, this is made up for with a high number of place of articulation contrasts (5 in Gurindji, but up to 6 or 7 in other Australian languages) (Fletcher and Butcher 2014).

The vowel system of Gurindji consists of three vowels with a marginal length contrast, which are described as /ɪ, ʊ, ɐ/ in Figure 10 (see Jones et al 2012: 309).

2.2.1.2 Kriol

Kriol shares a very similar inventory to that of Gurindji; however, some researchers suggest that the Roper dialect spoken in the community of Ngukurr contains a stop voicing contrast (Baker, Bundgaard-Nielsen, and Graetzer 2014) in addition to a fricative and an affricate series. Yet, varieties of Kriol with little contact with their lexifier languages have been shown to lack fricatives all together (Sandefur 1979, 1984, 1986; Sandefur and Harris 1986).

According to Jones, Meakins and Buchan (2011) the vowel inventory of Kriol spoken in Katherine contains five-vowels (see Figure 11). However, varieties with little

Table 3: Consonant inventory for Gurindji based on (Meakins et. al 2013).

	Bilabial	Labiodental	Dental	Apico-Alveolar	Postalveolar	Retroflex	Pre-Palatal	Velar	Glottal
Plosive	P			t		ʈ	c	k	
Nasal	m			n ɳ			ɲ	ŋ	
Trill				r					
Tap				ɾ					
Approximant						ɻ	j	w	
Lateral Approximant				l		ɭ	ʎ		

Table 4: Consonant inventory for Roper Kriol based on Baker, Bundgaard-Nielsen, and Graetzer (2014).

	Bilabial	Labiodental	Dental	Apico-Alveolar	Postalveolar	Retroflex	Pre-Palatal	Velar	Glottal
Plosive	p b		t̪ d̪	t d		ʈ ɖ		k g	
Nasal	m			n ɳ			ɲ	ŋ	
Trill				r					
Tap				ɾ					
Fricative		f		s ʃ					h
Affricate				ʧ ʤ					
Approximant						ɻ	j	w	
Lateral Approximant				l		ɭ	ʎ		

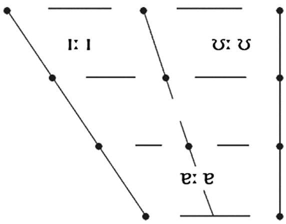

Figure 10: Vowel inventory for Gurindji (based on Jones, Meakins and Buchan 2011).

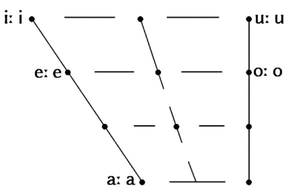

Figure 11: Vowel inventory for Kriol (based on Jones, Meakins and Buchan (2011).

contact with their lexifier languages have been shown to contain three vowels (Sandefur 1979).

2.2.2 Obstruents

Similar to Media Lengua, the stop voicing phonemic conflict site in Gurindji Kriol includes /p-b/, /t-d/, /k-g/ from Kriol, and /p/, /t/, /k/ from Gurindji. For Gurindji Kriol, English origin words in the Kriol lexicon are of greatest interest as English is originally responsible for bringing these contrasts into the language. Unlike Media Lengua, production of the voiced series of stops in Gurindji Kriol provides an example of mixed assimilation and integration, of an introduced sound contrast into the phonology of a mixed language, where the ancestral language had no such contrast (Jones and Meakins 2013). The production results of stops in word-initial position (Figure 12) from Jones and Meakins (2013), involving 330 tokens produced by 5 women, showed that speakers produce the bilabial series with short lag VOT no matter the language of origin. For the alveolar series, results show a high degree of variation in the VOT durations of Kriol origin /t/, ranging from long lag values (approx. 64 ms) to short lag values (approx. 0 ms). The VOT of both Kriol /d/ and Gurindji origin /t/ are produced with short lag values (approx. 21 ms & 18 ms respectively). The VOTs of the velar series show a gradient trend with Kriol origin /k/ being longer than Kriol origin /g/ and Gurindji origin /k/ being the shortest. However, averages of all three suggest they are all produced with relatively short lag values (max. approx. avg. 39 ms). Jones and Meakins (2013) also measured the VOT of affricates /ʧ/ and /ʤ/ in word-

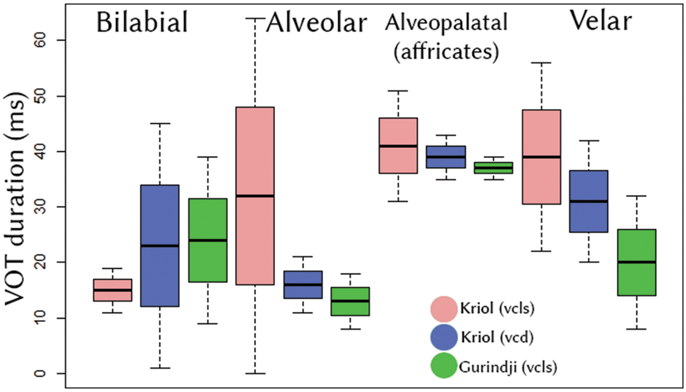

Figure 12: Word-initial VOT durations across place of articulation in Gurindji Kriol based on language of origin (EDA8A8 for voiceless stops of Kriol origin, 6478D1 for voiced stops of Kriol origin, and 66C24A for voiceless stops of Gurindji origin). This figure is roughly based on Figure 1 from Jones and Meakins (2013).

initial position. Their results show similar values no matter the language of origin (approx. avg. 39 ms +/– 2 ms).

Jones and Meakins (2013) also measured VOT durations from word-medial stops in addition to their closure durations. Their results (Figure 13A) for VOT show that Kriol origin /p/, with short lag VOT, differed significantly from both Kriol and Gurindji origin /b/ and /p/ with negative VOTs. However, little variation was revealed for the alveolar and velar series based on language of origin. For the affricates, VOT measurements from Kriol origin voiceless /ʧ/ were shown to be long lag, while Gurindji origin /ʧ/ were shown to be negative (Kriol origin voiced /ʤ/ was not analysed in their study).

Closure durations showed the same tendencies as the word-medial VOT durations (Figure 13B). Here, the bilabial closures for Kriol origin voiceless /p/ were significantly longer than those of Kriol origin /b/ and Gurindji origin /p/; the latter two being roughly similar in duration. Likewise, there was little variation between closure durations in both the alveolar and velar series based on language of origin. Reflecting the medial VOT durations once again, the closure durations for the affricates differed significantly with Kriol origin voiceless /ʧ/ being much longer than Gurindji origin /ʧ/.

Regarding perception of Gurindji Kriol stops by native speakers, Stewart et al. (2018) suggest a voicing contrast may currently be developing with increasing contact with mainstream English. Like the Media Lengua perception studies, a 2AFC identification task experiment was conducted. Fifty-nine participants took part in this study which used modified VOT values between prototypical voiced

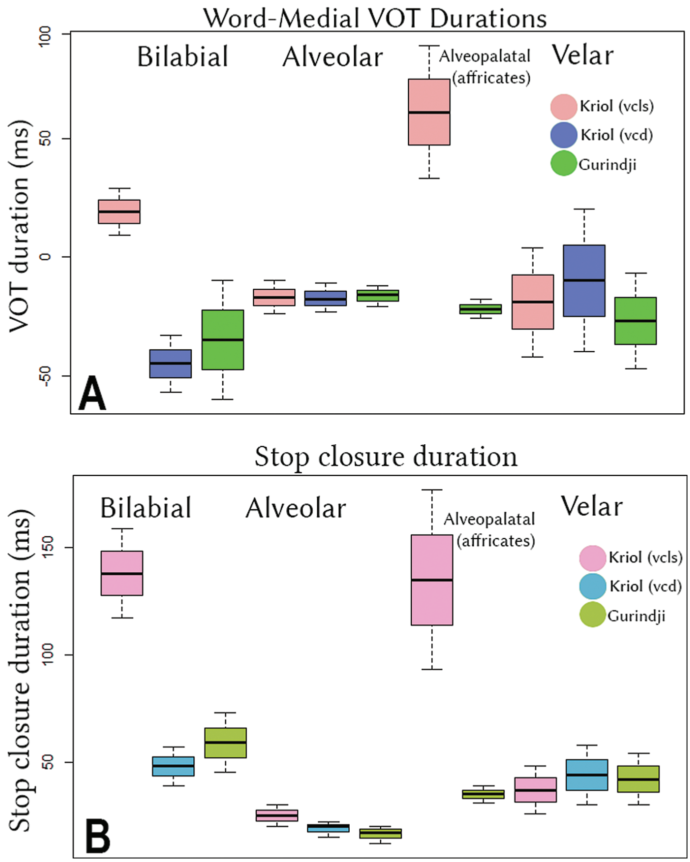

Figure 13: Image A illustrates word-medial VOT durations across place of articulation in Gurindji Kriol based on language of origin (EDA8A8 for voiceless stops of Kriol origin, 6478D1 for voiced stops of Kriol origin, and 66C24A for voiceless stops of Gurindji origin). This figure is roughly based on Figure 4 from Jones and Meakins (2013). Image B illustrates closure duration of word-medial stops across place of articulation in Gurindji Kriol based on language of origin (EDA8CE for voiceless stops of Kriol origin, 64B4D1 for voiced stops of Kriol origin, and A8C24A for voiceless stops of Gurindji origin). This figure is roughly based on Figure 5 from Jones and Meakins (2013).

and voiceless stops ([p-b], [t-d], [k-g]) in word-initial position, across 7, 10-step continua. In-line with Jones and Meakins' (2013) observations for word-medial VOT and closure production, Stewart et al.'s (2018) perception results revealed that listeners are able to perceive consistent differences in voicing between bilabial stops ([p-b]), while results were more variable for the alveolar and velar

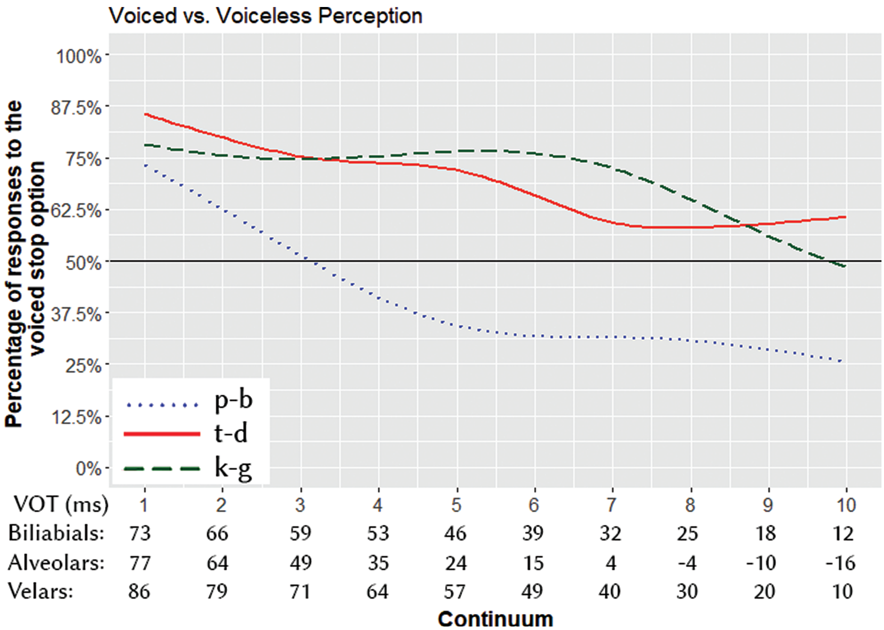

Figure 14: 2AFC identification task results for Gurindji Kriol listeners averaged across the 10-step continua for each place of articulation based on Stewart et al. (2018).

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stimuli, ([t-d] & [k-g]), with only an estimated 39% of the participants able to identify consistent differences (see Figure 14).

A similar story can be told for fricatives /f/ and /s/ in Gurindji Kriol. Butcher (2006) shows the majority of Australian languages, including Gurindji, lack phonemic fricatives, however Sandefur (1979) shows the production of fricatives in Kriol is highly variable with their stop counterparts. Buchan (2012) specifically addresses the possibilities of production contrasts between voiceless fricatives and stops ([f-p] & [s-t]) with an analysis of maternal speech in Gurindji Kriol. While trends suggest variability across place/ manner of articulation, mother's speech of word-initial fricatives became more regularised, when communicating with older children. According to a perceptual study of this same conflict site by Stewart et al. (submitted), perception of [f-p] and [s-t] were also quite variable with just over half the participants showing a strong contrast between the pairs while the other half either had consistent responses to the fricative stimuli but random responses to the stops. Yet others only showed consistent responses to the fricatives. Kriol listeners showed similar results.

2.2.3 Vowels

According to Jones, Meakins and Buchan (2011) Gurindji Kriol has interact-ing source vowel systems consisting of /ɪ, ɐ, ʊ/ from Gurindji and /ɪ, e , æ , ɔ, ʊ, ɐ, i ː, ɜː, o ː, ʉː, ɐː/ from English, which have subsequently reduced to /ɪ, ɛ, ɐ, ɔ, ʊ/ in Kriol via the original pidgin language. With data from 894 spontaneous speech tokens taken from a single female speaker, Jones, Meakins and Buchan (2011) demonstrated there exists greater formant (both F1 & F2) overlap in the mainstream Australian English-source front vowels /æ/ and /e/ and back vowels /ʉː/ and /oː/ in Gurindji Kriol compared to their English cognates – a result which may suggest that Gurindji Kriol is expanding its vowel inventory from its original ancestral (Gurindji) inventory. However, Jones, Meakins and Buchan (2011) also show that the duration differences between the Gurindji Kriol lengthening contrasts (e.g., /ɪ/ and /iː/) are also reduced compared to those in Standard Australian English.

While van Gijn's analysis does not include Gurindji Kriol to support his theory of mixed language phonology, the language is categorised as a V-N mixed language like Michif. Therefore, there should be greater stratified elements at the phonological level. However, the results from these studies suggest that Gurindji Kriol has a mix of overlapping categories (e.g., emergent vowels currently operating with considerable overlap in the production domain, described in 2.2.3), assimilated categories (e.g., /t-d/ & /k-g/ in the perceptual domain, described in 2.2.2), and integrated categories (e.g., the /p-b/ contrast in the perceptual domain described in 2.2.2).

2.3 Michif

Michif (ISO 639-3: crg) is a V-N mixed language spoken sparsely throughout Manitoba, southern Saskatchewan and North Dakota (see Mazzoli 2019). It emerged in the early 19th century through intermarriages between First Nations women and French speaking fur traders. Unlike, Gurindji Kriol, the introduced language (French) is responsible for the bulk of nominal phrase elements, while the ancestral language (mainly Plains Cree) provides the bulk of the verb phrase, additionally, the origin of the majority of the lexicon coincides with the origin of the phrase. In (3), the bolded elements in the IPA transcription are of French origin while those in normal font are of Cree origin. A French translation is provided for comparison.

(3) *Gaa wiichihow mamaan avik loovraazh daan la mayzoon.*

gaː	wiːʧiha̯o	**mamãː**	**avek**	**l-oːvraːʒ**	**dãː**	**la**	**mezõː**
1.FUT	help.3	mom	with	DET-work	in	DET.F	house

'J'aiderai à ma maman avec l'ouvrage/ménage dans la maison.' (French)
'Nika wîcihâw nikâwiy ta kîsihtât wâskahikan atoskêwin.'[7] (Cree)
'I'll help my mom with the housework.'
(Gabriel Dumont Institute 2009)

2.3.1 Source language inventories

The Plains Cree phoneme inventory is made up of 10 consonants (Table 5) and 4 vowels with a length contrast in three positions (Figure 15). Canadian French contains 21 consonants (Table 6) and 17 vowels, with several nasal and length contrasts (Figure 16). Comparing the phoneme inventories from both languages, 41 possible phonemic conflict sites can be identified; 10 from Cree (short vowels: /i, u, a/, the long vowel: /eː/, glottals: /ʔ, h/, and alveolars: /t, n, s, ʦ/, which are realised as dentals in French) and 31 (/b, t̪, d̪, g, n̪, ɲ, ŋ, r, ʀ, f, v, s̪, z̪, ʃ, ʒ, ʦ̪, ʣ̪, ɥ, l̪, y, ẽ, ø, ɛː, ɛ, œ, œ̃, ã, ɑ, o, õ, ɔ, ə/) from French.

Table 5: Consonant inventory for Plains Cree based on Wolfart (1973).

	Bilabial	Dental	Alveolar	Postalveolar	Palatal	Velar	Glottal
Plosive	p		t			k	ʔ[?]
Nasal	m		n				
Fricative			s				h
Affricate			ʦ				
Approximant					j	w	

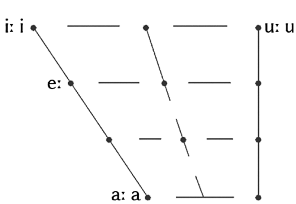

Figure 15: Vowel inventory for Plains Cree based on Wolfart (1973) and Muehlbauer (2012).

7 Translated by Randy Morin.

Table 6: Consonant inventory for Canadian French based on Walker (1984).

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Palatal	Velar	Uvular
Plosive	p b		t̪ d̪				k g	
Nasal	m		n̪			ɲ	ŋ	
Trill				[r]				ʀ
Tap								
Fricative		f v	s̪ z̪	ʃ ʒ				
Affricate			[t̪s̪ d̪z̪]					
Approximant						j ɥ	w	
Lateral Approximant			l̪					

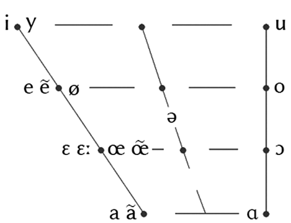

Figure 16: Vowel inventory for Canadian French based on Santerre (1974) and Walker (1984).

2.3.1.1 Plains Cree

Like most Algonquian languages, Plains Cree lacks phonemic voicing contrasts in the obstruent series. Plains Cree also differs from other varieties of Cree (e.g., Swampy, Moose, Northern, etc.) in that it lacks the rhotic /r/, and the post-alveolar /ʃ/ and approximant /l/ (labial-dental [ð] in some varieties) are produced as /s/ and /j/, respectively. However, Plains Cree has a rich inventory of consonant clusters and diphthongs.

According to Wolfart (1973) and Muehlbauer (2012), the vowel inventory of Plains Cree contains three vowels with a lengthening contrast in every position with an additional long mid-front vowel (/eː/). The description of the back vowel varies among authors who describe it as high (/u/), mid-high (/o/), or lax (/ʊ/) (see Muehlbauer 2012 for a complete analysis).

2.3.1.2 Canadian French

French spoken throughout Canada varies greatly with a large number of regional dialects and sociolects. However, unlike Spanish spoken in Ecuador, there is little influence from First Nation languages on the French phonological system. Table 6 provides the phoneme inventory for Canadian French with a few prominent allophones which differ from European varieties.

Unlike the other languages described hereto, the vowel inventory of Canadian French is extensive and contains contrasts consisting of rounding, length, and nasalisation, which vary in their place of articulation. Figure 16 provides the vowel inventory for Canadian French.

2.3.2 Obstruents

Michif has a similar stop voicing phonemic conflict site to that of Media Lengua, with a voicing contrast from the introduced language (French /p-b/, /t-d/, /k-g/) and a single series of voiceless unaspirated stops from the ancestral language (Cree /p/, /t/, /k/). In a study on stop production in Michif, involving 446 tokens gathered from oral descriptions of the Pear Film (Chafe, 1980) from 10 speakers (5 women/5 men), Rosen et al. (2019) showed that, unlike Media Lengua, Michif speakers consistently produced short-lag unaspirated French-origin stops with VOTs in a similar range as Cree-origin unaspirated stops (Figure 17). The authors note that while some deviation appears (i.e., the median notches in Figure 17 do not line up perfectly), the actual median values of all three groups only differ by 18 ms; a VOT range that is normally considered to be non-contrastive for voiceless and voiced stops.

2.3.3 Vowels

The originators of Michif dealt with highly complex source vowel systems. While it is often not mentioned in the literature, numerous English lexical items also exist in Michif which could hypothetically bring the total number of vowels to 37, if speakers operationalised all three systems.[8] Even though this size of vowel inventory is not documented in the world's languages, many researchers claim that Michif's phonology is stratified (see e.g., Bakker and Papen 1997; and subsequent work based on this analysis). To test this claim, Rosen et al. (2020) investigated phonological stratification with an acoustic analysis of F1 and F2 formant frequencies and vowel duration. Their results, involving 2,678 tokens collected from the same data detailed in section 2.3.2, reveal that only two French vowels appear to

8 Including 12 Canadian English vowels.

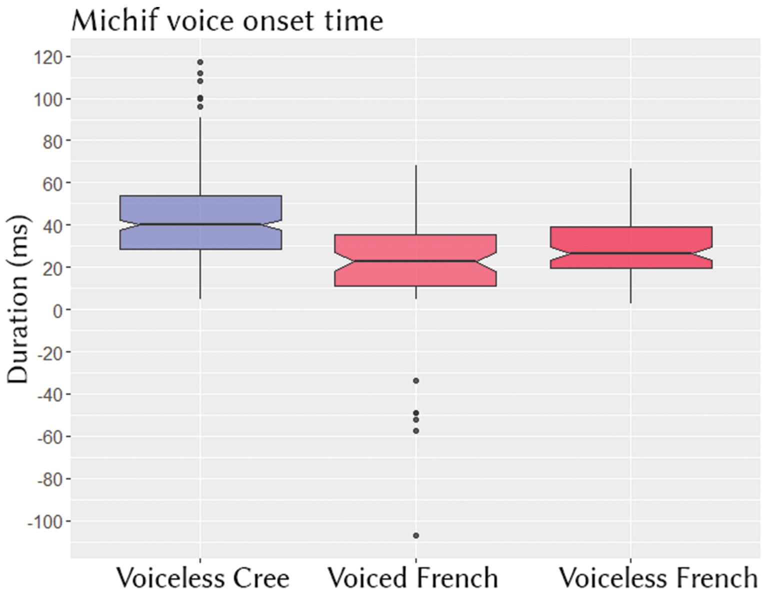

Figure 17: Michif VOT based on source language.

differ significantly from their Cree counterparts (/ɛ, ɔ/) while the rest undergo assimilation to the Cree system. This leaves Michif with 9 manageable vowels with acoustic spaces that differ significantly from other neighbouring vowels (see Figure 18).

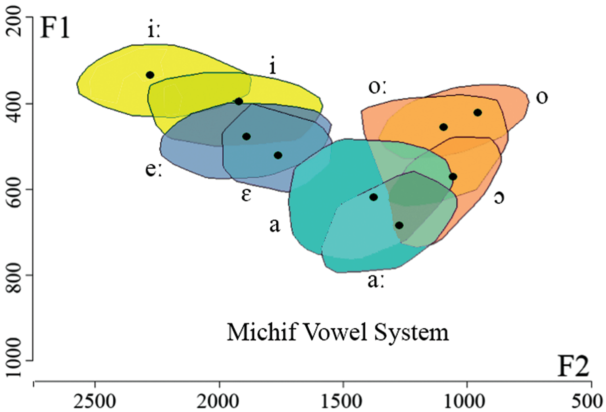

Figure 18: Michif vowel system based on Rosen et al. (2020).

Their results reveal once again that the ancestral language in a mixed language plays a primary role in providing phonetic material as Michif's vowel system largely reflects that of Cree, with only two mid-low vowels added from French. Moreover, results from this study reveal yet again that assimilation vs. integration of phonemes from the introduced language is not a straightforward process.

2.3.4 Suprasegmentals

Rosen (2006) describes stress patterns in Michif and concludes that Michif is a combination of both Cree and French stress systems. Her results suggest Michif stress assignment is very similar to that of Cree with the exception of the word level where the language is quality sensitive, as is the case in French.

3 Discussion

The results from the acoustic studies presented in this chapter suggest that stratification at both the segmental and suprasegmental level is more complicated than a simple clear-cut division between source languages. Many of the different phonological arrangements found throughout these acoustic analyses are non-conventional in the sense that in order to maintain clear perceptual differences between phonemes, categorical dispersion would be expected (e.g., /i/ and /e/ categories with clear vowel space separation or stop categories with VOT durations limited to a unique range with little overlap). On the other hand, if a given phonemic contrast is not important in a mixed language, assimilation would be expected. Instead, one finds overlapping categories and near-mergers (e.g., Media Lengua vowels), categories that are only perceptually contrastive in one position and not in others (e.g., Gurindji Kriol stop voicing contrasts), weaker degrees of categorical identification than would be expected for fully contrastive phonemes (e.g., Gurindji Kriol stop-fricative contrasts), and partially integrated systems (e.g., the Michif vowel system).

The combined results of these studies also suggest that when stratification is observed, it is most likely the result of various underlying acquisition, cognitive, and structural processes and not simply an awareness of source-language divisions (as appears to be the case with higher-level linguistic phenomena involving the mixing of lexicon, morphosyntax, semantics). Such processes could include, but may not be limited to, the age of acquisition of the introduced language during the creation of the mixed language, proficiency in or exposure to one, both, or none of the source languages, and extra-linguistic influences of the source languages (e.g., prestige), and the level of functional load required to maintain an optimum level of phonemic and prosodic contrasts in the mixed language. Because of these realities, the phonetic outcomes of mixed language sound inventories reflect the speech of mid- to late-bilinguals in that phonological conflict sites are either not fully acquired, assimilated, or acquired, but not to the same degree as would be expected by monolingual native speakers. This is apparent in how mixed languages overwhelmingly conform to the phonological system of the ancestral source language spoken before the introduced language was present.

The fact that some contrasts are adopted while others are not might also indicate that cognitive factors function to shape the phonological system of a mixed language; factors that could be beneficial for distributing functional load, levelling out phoneme frequency, and allowing for a greater number of contrasts leading to greater phonological optimization. However, the unpredictable outcome of a mixed language's phonological system should not come as a surprise since the phonological shells of entire linguistic systems and/or categories undergo transfer to a new system in a remarkably short period of time before becoming nativised.

Plans are in the works to test the functional load hypothesis with Media Lengua, which could be expanded to other mixed languages. Phonetic studies are also planned for Ma'a (Tanzania), work by Gonzales (see e.g., Gonzales 2017, 2018) is shedding light on the vowel system of Philippine Hybrid Hokkien (Philippines), Bundgaard-Nielsen and O'Shannessy are working on phonetic aspects of Light Warlpiri (Australia), and additional phonetic studies are planned for Gurindji Kriol. These studies will allow us to further test and refine our hypotheses.

Are the phonologies of mixed languages special? In short, not particularly. Impressionistically, mixed languages, creole languages (especially when not in contact with their lexifiers), and borrowings found in virtually every language show a propensity to conform to the phonological make up of their ancestral source language(s) e.g., Media Lengua sounds like Quichua ([kiri-] *not* [kere-] for *quer-* 'want'), Michif sounds like Cree ([li fizi] *not* [le fyzi] for *les fusils* 'the rifles'), Haitian Creole reflects its substrate languages (namely Fon) in pronunciation ([ʃãm] *not* [ʃãbʀ] for *chambre* 'room'), and English borrowings in monolingual Spanish often conform to Spanish phonology ([fʷul] *not* [fʊɫ] *full* for 'full'). Moreover, like the acoustic analyses of mixed languages presented hereto, phonetic analyses of both creoles and "conventional" borrowings show sounds do not confirm in a binary fashion (e.g., assimilation vs. integration). For example in Cavite Chabacano, a Spanish lexified Creole with a Tagalog substrate, Lesho (2013) shows that mid vowels in unstressed positions are raised in Cavite Chabacano and overlap their Tagalog origin high vowel counterparts, yet mid and high vowel categories remain separate in stressed positions. While Quichua does not reflect Media Lengua exactly in its borrowing tendencies, regarding phonetic material and perception, overlapping mid- and high-vowels are still present. For Australian Kriol, listeners tested using the same stop-fricative identification task experiment as the Gurindji Kriol listeners, showed greater degrees of contrast but not to the same extent that would be expected if the contrast played an important role in the phonology of the language (Stewart et al. ~~submitted~~). Additional examples abound in the literature which are too numerous to list here. Again, these realisations all point towards acquisition and cognitive processes that determine the arrangement of a phonological system in a contact language more than a simple awareness of divisions based on language of origin of a given lexical item or phrase.

Abbreviations

3	third person
DET	determiner
ERG	ergative
F	feminine
FUT	future
LOC	locative
PST	past
TOP	topic marker
TR	transitive
TRANS	translocative
VAL	validator marker

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