A Brief Descriptive Grammar of Pijal Media Lengua and an Acoustic Vowel Space Analysis of Pijal Media Lengua and Imbabura Quichua

by

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Abstract

This thesis presents an acoustic vowel space analysis of F1 and F2 frequencies from 10 speakers of a newly documented variety of Media Lengua, called Pijal Media Lengua (PML) and 10 speakers of Imbabura Quichua (IQ). This thesis also provides a brief grammatical description of PML with insights into contrasts and similarities between Spanish, Quichua and other documented varieties of Media Lengua, namely, Salcedo Media Lengua (Muysken 1997) and Angla Media Lengua (Gómez-Rendón 2005). Media Lengua is typically described as a mixed language with a Quichua morphosyntactic structure wherein almost all content words are replaced by their Spanish-derived counterparts through the process of relexification. I use mixed effects models to test Spanish-derived vowels against their Quichua-derived counterparts in PML for statistical significance followed by separate mixed effects models to test Spanish-derived /i/ vs. /e/ and /u/ vs. /o/ for statistical significance. The results of this thesis provide suggestive data for (1) co-existing vowel systems in moderate contact situations such as that of Quichua and (2) moderate evidence for co-existing vowel systems in extreme contact situations such as mixed languages. Results also show that (3) PML may be manipulating as many as eight vowels wherein Spanish-derived high vowels and low vowels co-exist as extreme mergers with their Quichua-derived counterparts, while high vowel and mid vowels co-exist as partial mergers; and (4) IQ may be manipulating as many as six vowels instead of the traditional view of three wherein Spanish-derived high vowels have completely merged with their native Quichua counterparts. Spanish-derived low vowels co-exist as extreme mergers with their native Quichua counterparts and high vowel and mid vowels co-exist as considerable mergers.

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Dedication

Para Gaby – *por tu amor infinito ∞ te amo.*
To Kim – *my soulmate.*
To Katie and Kelly – *my inspirations.*

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Abbreviations

AD	Adaptive Dispersion
AML	Angla Media Lengua
BIC	Bayesian Information Criterion
CI_{95}	95% Confidence Intervals
CS	Colonial Spanish
EB	Early Bilinguals
EHS	Ecuadorian Highland Spanish
F1	Formant 1
F2	Formant 2
F3	Formant 3
FFT	Fast Fourier Transformation
Hz	Hertz
IQ	Imbabura Quichua
kHz	Kilohertz
L1	First Language
LB	Late Bilinguals
LPC	Linear Predictive Coding
LW	Light Warlpiri
MCMC	Monte-Carlo Markov chain
ML	Media Lengua
p	P-Value
PC	Personal Computer
PML	Pijal Media Lengua
Q	Quichua
QI	Languages of the Quechuan 1 branch
QII	Languages of the Quechuan 2 branch
QIIA	Languages of the Quechuan 2A branch
QIIB	Languages of the Quechuan 2B branch
QIIC	Languages of the Quechuan 2C branch
QIII	Languages of the Quechuan 3 branch
SB	Simultaneous Bilinguals
SLM	Speech Learning Model
SML	Salcedo Media Lengua
SOV	Subject – Object – Verb
SP	Spanish
t	T-value
TMA	Tense-mode-aspect
VOT	Voice Onset Time
WAV	Waveform Audio File Format
β	Coefficient Estimate

Glosses

1	First Person
2	Second Person
3	Third Person
(q)	Quichua-Derived
(sp)	Spanish-Derived
1DO	Patient Marker
ABL	Ablative
ACC	Accusitive Marker
AG	Agentive Marker
Arc	Archaric
AUG	Augmentative Marker
AUG	Augmentative Marker
BEN	Benefactive Marker
CAU	Causative Marker
COM	Commitative Marker
COND	Conditional
CONJ	Conjunction
DEP	Despreciative Marker
DES	Desiderative Marker
DET	Determiner
DIM	Diminutive Marker
DIR	Directional Marker
DOM	Possessor Marker
DS	Different Subject
DUB	Non-Evidentual Dubitative Marker
EAF	Emphatic Affirmation of Certainty
EXCL	Exclusive Marker
F	Feminine
FORMAL	Formal/Polite/Honourific pronoun
FUT	Future
GEN	Genitive Marker
IMP	Imparative Marker
IMP(pol)	Polite Imparative Marker
INF	Infinitive Marker
INFER	Inferred Information Marker
INST	Instrumental Marker
Q(wh)	Wh Question Marker
INTRA	Intrative Marker
LOC	Locative Marker
M	Masculine
NEG	Negative Marker
NOM	Nominal Marker

p	Intrinsic Plural
PAST	Past
PP	Past Participle Marker
PL	Plural Marker
POSS	Possessive
POST	Postessive Marker
PREP	Preposition
PRES	Present
PROG	Progressive/Continous Marker
QUOT	Quotative
RECP	Reciprocal Marker
REFL	Reflexive Marker
REP	Reportative Marker
s	Singular
SEMB	Semblative Marker
SS	Same Subject
SSC	Same Subject Gerund/Converb
SUBJ	Subjunctive
SUPER	Supersessive
TERM	Terminative
TOP	Topic Marker
TOT	Totality Marker
TRANS	Translocative Marker
VAL	Validative Marker
VERB	Verbalization

1 Introduction

In November of 2010, I recorded for the first time a variety of Media Lengua called *Chaupi-Shimi* [ˈʧaupi ˈʃimi] (half-language) in the community of Pijal Bajo. (0°10'39.06"N, 78°11'42.07"W). Pijal Bajo is located in Imbabura, the second most northern Andean province of Ecuador. The local and surrounding inhabitants claim the Pijal Media Lengua (PML) dialect is the progenitor of the nearby Angla Media Lengua (AML) variety documented by the Ecuadorian linguist Jorge Gómez-Rendón (2005). Based on the data collected and testimony of the locals, it is apparent that PML is distinct from the Angla dialect at both the lexical and morphosyntactic level. The Pijal locals and officials also say that nobody has ever come to their community with the intentions of documenting their language.

Figure 1: Map of Ecuador (Sankakukei, 2009)

Media Lengua (ML) is a rare mixed language sparsely found throughout the Andean region of Ecuador. ML is typically described as a mixed language with a Quichua[1] morphosyntactic structure wherein almost all content words[2] are replaced by their Spanish-derived forms through the process of relexification (Muysken 1997:365).[3] Several hypotheses exist to its origin: Muysken (1997:376) suggests Salcedo Media Lengua (SML) arose through ethnic self-identification for indigenous populations who could not identify completely with either rural Quichua or urban Spanish cultures: Gómez-Rendón (2005:1) says AML arose because of prolonged contact between the Quichua speaking indigenous with the Spanish speaking population. Dikker (2008:121) believes ML was "created by men who had Quichua as their native language but left to work in Spanish speaking areas. When they returned to the communities, they had been using Quichua on an infrequent basis, while having acquired relatively fluent urban Spanish." She believes ML was used as a link between the older monolingual Quichua speaking generation and the younger monolingual Spanish speaking generation.

According to The Ethnologue of the World's Languages (2009) of the 6,909 documented languages, 23 are considered a mixed language. However, Bakker (2003) says there are at least 27. The idea of language mixing is hardly unheard of. Clough (1876:1) said that certain philologists assumed that a mixed language was impossible. He

[1] The Ecuadorian variety of Quechua is known as *Quichua* or *Kichwa* /ˈki.tʃua/ by both mestizo and indigenous populations.

[2] By 'content words', I mean the usual lexical categories of noun, verb, adjective and most adverbs.

[3] In the mid-1970's, the Dutch linguist Pieter Muysken documented the first variety of ML in the province of Cotopaxi in the outskirts of Salcedo, a town located three hours south of Quito by bus (Muysken, 1980, 1981b, 1997). Muysken also found other highly relexified varieties of Quichua, which include Amazonian Pidgin, Quichua-Spanish interlanguage, Saraguro Media Lengua and Catalangu spoken in the province of Cañar (1997). Based on the interpretation of relexified Spanish elements, it is apparent that these varieties emerged independently of SML (Muysken 1997:418). As we will see in section 4, the same cannot be said for PML. Gomez-Rendón (2005) published a brief overview of Angla Media Lengua that was to a degree passed down from Pijal through intercommunity marriages in the 1950s and 60s.

argued however, that "language consists of three parts – sounds, words and grammar; and the mixture in any one of these points produces a mixed language". Futhermore, he says perfectly pure languages could have existed only in the early stages of society.

More recently, Thomason (2003:21) says that "all languages are mixed in a weak sense: there are no natural human languages in which foreign material is wholly lacking." She says what makes a *mixed language* different from typical contact-induced change is the inability to trace its origins back to a single source language using the diachronic concept of a genetic relationship wherein two daughter languages are altered forms of a single parent language. Within this framework, one or more of a mixed language's subsystems would not be able to be incorporated into this standard genetic depiction of a single source language.

The broadest definition of a mixed language is usually described as "a bilingual mixture, with split ancestry (Matras and Bakker 2003:1)". This statement has certain ramifications, as several languages with radical restructuring such as Javindo, Chavacano and Berbice Dutch may be classified as mixed creoles and therefore, are not formed in bilingual situations (Matras & Bakker 2003). Bakker (as cited in 2004) considers there to be six types of mixed languages rooted in the mixed language speakers' knowledge of the source languages' functionality, the typology of the structure and other social factors. They can be classified as (1) plain, (2) conventionalized, (3) special lexicon of foreign origin, (4) radical restructuring, (5) mixed creole and (6) extremely heavy borrowing (Meakins 2004). Matras & Bakker (1997:7) show that Media Lengua falls into the category of a conventionalized mixed language, languages which are typically spoken

alongside their source languages (the inhabitants of Pijal who speak Media Lengua also speak Spanish and Quichua).

Factors for explaining the formation of a mixed language include: relexification (Muysken 1981), language intertwining (Bakker 1997) and matrix language turnover (Myers-Scotton 1998). Media Lengua is regarded as having formed on the basis of relexification (Muysken 1980) or transrelexification according to Muysken (1981). Muysken (1981) describes relexification as the process of lexical borrowing wherein the large part of an L2 vocabulary replaces native L1 items, rather than coexisting synonymously or in a near synonymic relationship. Muysken explains the process of transrelexification as a hybrid of relexification wherein the process of vocabulary replacement takes place on an accumulative scale wherein each subsequent feature must be present in order to form the next level. The most basic type simply needs a phonological shell of a lexeme, whereas the most complex type contains all possible adaptive features:

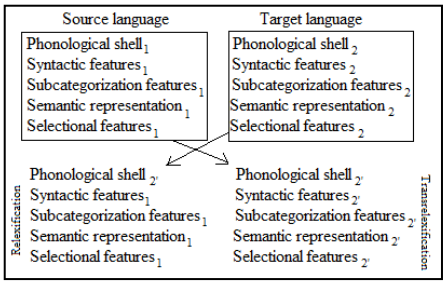


Figure 2: Transrelexification – Based on Muysken 1981

The literature on mixed languages is not without its controversy and Media Lengua has been used as a focal point of discussion. The following is based on an overview of the controversies in McConvell and Meakins (2005:12). Bakker (1997)

considers four fundamental groups of mixed languages: (1) intertwined languages (lexical-grammar, including Media Lengua); (2) converted languages (form-semantic); (3) lexically mixed languages (lexicon A+B); and (4) verb-noun mixed languages e.g. Michif, a French-Cree mixed language spoken in the Canadian and US prairies (Meakins 2004). According to McConvell and Meakins (2005:12), "Bakus (2003:265), sees the split between 'content' and 'grammar' as found in Media Lengua as the defining characteristic of mixed languages". Myers-Scotton (1999) says that code-switching plays the largest role in mixed language formation. Meakins (2004) says Myers-Scotton's Matrix Language Turnover model is based on fossilized or 'frozen'[4] forms of code-switching vocabulary from a dominant language into the new mixed language. This theory disqualifies Media Lengua as a mixed language due to "the absence of an abstract grammatical structure from both languages" which should, theoretically, be a prominent feature of a code-switching induced mixed language (Bakker 2003:91).

Mixed languages should not be confused with jargons, pidgins or creoles. Pidgins typically develop between two groups that have not learned to communicate in each other's native language. They are commonly associated with limited vocabularies and simplified grammatical structures with high variability (Bakker 1997:10). The prelude to a pidgin is referred to as jargon and once the pidgin is nativized it is, circumstantially, considered a creole. Mixed languages do not fit any of these cases since languages like Michif (Bakker 1997) and Media Lengua (Muysken 1997) do not contain reduced vocabularies or simplified morphosyntactic systems. Moreover, mixed languages cannot be considered lingua francas, which are typically used for external communication settings among speakers of different L1s, e.g. trade, international congresses; mixed

[4] See section 4.5 for a description of lexical freezing

languages are used internally among community members (Bakker 1997:10). Bakker (1997:10) also says that lingua francas typically have historical significance. However, there was no mention in print of Michif before the 1930s (Bakker 1997:10) and the same held true for Media Lengua until Muysken's (1980) first publications.

This thesis consists of two main parts. The first is a brief grammatical description of PML (section 4) wherein I compare it to other documented varieties of Media Lengua, namely, Salcedo Media Lengua (Muysken 1997) and Angla Media Lengua (Gómez-Rendón 2005). The second major part (section 6) is a comparative analysis of formant one (F1) and formant two (F2) features in both PML and Imbabura Quichua (IQ) from the nearby and historically related communities of Chirihuasi and Cashaloma. This section provides acoustic evidence which shows treating PML and IQ as a three or five vowel system is a gross oversimplification and that, depending on how you want to define a vowel category, PML speakers may be manipulating as many as eight vowels while IQ may be manipulating up to six. Here, I provide evidence for the existence of a fourth and fifth vowel, /e/ and /o/ respectively, in both ML and IQ in what are both traditionally considered three vowel systems (Muysken 1997:336, Guion 2003:104). This evidence shows the possibility of three more vowels in PML, a Spanish-derived /i/, /u/, and /a/ subset which co-exist as extreme mergers along with the Quichua-derived /i/, /u/, and /a/ subset. Similarly, I provide evidence for possibility of one more vowel subset in IQ, Spanish-derived /a/ which co-exists as an extreme merger along with Quichua-derived /a/.

The lack of acoustic data and in-depth phonetic analysis concerning mixed languages and Quichua's relexified Spanish vocabulary in the current literature has prompted this investigation. Only two sources, Guion (2003) and Kolberger (2010), provide any insights into the acoustic structure of Quichua vowels. However, both authors intentionally avoid relexified vocabulary in order to avoid 'cross-contamination' of Spanish sounds. Nonetheless, this investigation has documented 29% to 65% (avg. 45%) relexification in spontaneous speech in both provinces wherein the aforementioned authors gathered fieldwork data.

Consultant	Sex	Age	Community	Parish	County	Province	Relexified %
6	F	42	X	X	Latacunga	Cotopaxi	42%
7	M	28	X	X	Latacunga	Cotopaxi	60%
8	F	20	X	X	Latacunga	Cotopaxi	35%
9	F	39	Llamawasi	Cochapamba	Saquisilí	Cotopaxi	35%
10	F	16	Llamawasi	Cochapamba	Saquisilí	Cotopaxi	45%
11	F	18	Llamawasi	Cochapamba	Saquisilí	Cotopaxi	28%
12	M	20	Sarausha	Cochapamba	Saquisilí	Cotopaxi	49%
15	M	59	Galpón	Bellavista	Salcedo	Cotopaxi	55%
16	F	59	Galpón	Bellavista	Salcedo	Cotopaxi	48%
17	M	45	Tigua	Zumbahua	Pujilí	Cotopaxi	54%
18	M	38	Tigua	Zumbahua	Pujilí	Cotopaxi	48%
19	F	34	Tigua	Zumbahua	Pujilí	Cotopaxi	32%
20	F	45	Tigua	Zumbahua	Pujilí	Cotopaxi	33%
21	M	52	Tigua	Zumbahua	Pujilí	Cotopaxi	54%
22	M	67	Sigchucalle	X	Salcedo	Cotopaxi	43%
23	M	55	Galpón	Bellavista	Salcedo	Cotopaxi	47%
24	F	46	Galpón	Bellavista	Salcedo	Cotopaxi	29%
25	F	48	Galpón	Bellavista	Salcedo	Cotopaxi	54%
26	F	25	Galpón	Bellavista	Salcedo	Cotopaxi	58%
27	F	27	Galpón	Bellavista	Salcedo	Cotopaxi	65%
28	F	30	San Pedro	Paquicahuán	Riobamba	Chimborazo	39%
29	M	73	Oksha	San Pedro	Otavalo	Imbabura	37%
30	M	?	Oksha	San Pedro	Otavalo	Imbabura	49%
31	M	30	El Topo	San Pedro	Otavalo	Imbabura	33%

Table 1: Spontaneous Speech Relexification Percentages[5]

Relexification is so prominent in some cases that when asked the native Quichua equivalent, consultants often had difficulties recalling, or asked others for help, or did not

[5] I based these percentages on spontaneous speech from topic chosen by the consultant. Repeated native and relexified vocabulary were not counted.

have an answer. Based on my data, these situations were most typical during elicited speech, where relexification fluctuated between 9% and 21% (avg. 14%) based on a 200 Swadesh word-list (Swadesh 1952), and 29% to 35% (avg. 31%) based on a broader 512 word list of broader general vocabulary.[6] Similar situations also took place under sentence elicitation with 12% to 23% (avg. 20%) relexification.[7] Sentences were based on 100 basic sentences containing, on average, 428 Quichua words that might typically be uttered on a daily basis. In rare instances, participants believed the relexified word in question was in fact Quichua[8] or responded with another relexified synonym[9].

Consultant	S	Age	Community	Parish	County	Province	Elicition	Relexified %
1	M	25	Quilotoa	Zumbahua	Pujilí	Cotopaxi	Swadesh/ BV	10% & 29%
2	F	28	Quilotoa	Zumbahua	Pujilí	Cotopaxi	Swadesh/ BV	21% & 33%
3	F	19	Quilotoa	Zumbahua	Pujilí	Cotopaxi	Swadesh	16%
4	F	38	Quilotoa	Zumbahua	Pujilí	Cotopaxi	Swadesh	14%
5	F	21	Quilotoa	Zumbahua	Pujilí	Cotopaxi	Swadesh	9%
55	M	66	Chirihuasi	La Esperanza	Ibarra	Imbabura	Sentences	14%
56	F	62	Chirihuasi	La Esperanza	Ibarra	Imbabura	Sentences	23%
57	F	45	Cashaloma	La Esperanza	Ibarra	Imbabura	Sentences	17%
58	F	29	Cashaloma	La Esperanza	Ibarra	Imbabura	Sentences	20%
59	F	21	Cashaloma	La Esperanza	Ibarra	Imbabura	Sentences	23%
61	F	42	Cashaloma	La Esperanza	Ibarra	Imbabura	Sentences	23%
63	M	28	Chirihuasi	La Esperanza	Ibarra	Imbabura	Sentences	22%
64	M	52	Chirihuasi	La Esperanza	Ibarra	Imbabura	Sentences	12%
65	F	55	Chirihuasi	La Esperanza	Ibarra	Imbabura	Sentences	23%

Table 2: Elicited Speech Relexification Percentages

I regard the use of relexified Spanish as so engrained in the Quichua vocabulary that it is only fair to assume any phonological crossovers have also become part of the Quichua phonemic/phonetic gammar, and should not necessarily be excluded from future analyses. In a language like PML, where it appears that almost all of the content roots are transparently of Spanish origin, the question of whether to exclude data due to

[6] The extended vocabulary list was comprised of the same 200 Swadesh word list plus 124 verbs, 25 greetings and conversational phrases, 25 adverbs, 227 nouns, 52 adjectives, 26 exclamations, 13 numbers, eight personal pronouns, eight possessive pronouns and four demonstratives taken from *Yachanawasiukupak Kichwashimi*, an introduction text for learners of Quichua (Aynaguano, 2010).

[7] Percentages are based on each word uttered per sentence.

[8] Typically archaic Spanish words i.e., */minisiˈtina/* 'need' from Spanish /menesˈter/ 'necessity'

[9] *Ciudad* /sjuḍaḍ/ 'city' translated as *villa* /biʒa/ 'villa'.

language-of-origin is meaningless. If the language is substantially 'mixed', then the question becomes whether 'mixture' means 'phonologically unified' or 'phonologically distinct'.

1.1 Phonetic Duality and Bilingualism

The following is a brief overview of the literature that touches on the topics of phonetic duality and bilingualism. Swadesh (1941:65) noted that bilinguals do not ordinarily have a single unified and accurate consciousness of their phonetic systems and therefore, "his phonemic system in each of the languages may be enlarged as compared with that of monolinguals by virtue of [their] capacity to introduce certain foreign sounds". He posited that two sound sets in complementary distribution can be considered a single system from the standpoint of phonemic theory. Though Swadesh believed bilinguals have a single system, he based this judgment on details stemming from the position of an unconscious dual phonetic system as well as sound sets in complementary distribution.

Weinreich (1974 [1953], cited in Guion 2003) said that "the phonemic systems of bilinguals are kept separate in two coexisting systems", based on the idea that bilinguals are typically aware of what language they are using.

Holden (1976:131) observed that "foreign features are not uniformly distributed over all segments of a given borrowing", saying that the "assimilation of individual features to their target phonetic constraints proceeds at different rates" and that the rate of assimilation is product of (1) the general constraint of the target, (2) "the segment class affected by the constraint", and (3) the syllabic position of the constraint.

Hinton (1991:137,147) proposed the convergence of phonological systems in contact situations based on diachronic evidence. One example is the reduction of the Cupan vowel system to four vowels from its proto-vowel system of five, through contact with the Yuman languages, which synchronically and diachronically have maintained three vowels, while other languages from the Cupeño family which have not had long term contact with the Yuman family maintain the five vowel inventory.

Recently, psycholinguistic experiments have begun to provide insights into the duality of phonetic systems in bilinguals. The Perceptual Assimilation Model proposed by Best et al. (2003) predicts that bilinguals assimilate L2 sounds based on how similar or contrastive a given sound is perceived. This theory suggests that bilinguals have only one phonological system where L2 sounds are produced on the basis of L1 patterns. Within this system categories are allowed to (1) merge into a single category, (2) stay independent, or (3) may co-exist with varying degrees of overlap. This model would therefore, predict that Spanish-derived /e/ and /o/ might emerge as new vowels and that /i/, /u/ and /a/ might (PML) or might not (IQ) end up with a Quichua subset and a Spanish subset.

Flege's (2007:370) Speech Learning Model (SLM) suggests that when an L2 learner establishes a new category, "their phonetic space becomes more crowded", causing dispersion "in order to maintain phonetic contrast". The SLM proposes that categories operate in the same phonological space and readjust according to external conditions. Earlier experiments by Flege Schirru and MacKay (2003) produced the same dispersion results based on exaggerated tongue movement according to F1 and F2

frequencies of L1 Italian speakers. These speakers had learned Canadian English at an early age but rarely spoke Italian.

Guion (2003) found that simultaneous bilinguals of Ecuadorian Spanish and Quichua maintained three separate front vowels: an /i/ with lower F1 frequencies for Spanish production, an /i/ with higher F1 frequencies for Quichua production, and an /e/ for Spanish production.

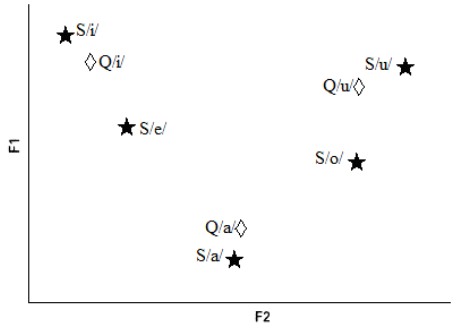


Figure 3: Quichua and Spanish vowel production of simiutaneous bilinguals. Based on Guion (2003)

Whereas late L2 learners merged both /i/s and the Spanish /e/ into the same vowel space, early (but not simultaneous) L2 learners tended to merge Spanish /i/ and Quichua /i/ into the same vowel space

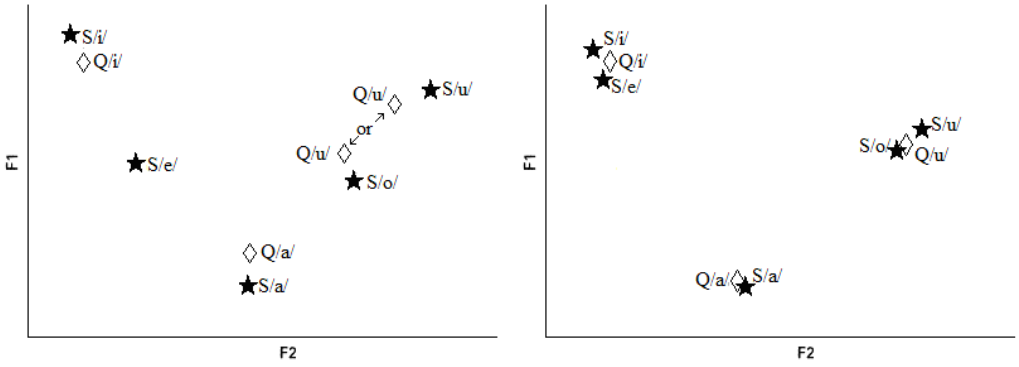


Figure 4: Left- Quichua and Spanish vowel production of early bilinguals. Right- Quichua and Spanish vowel production of late bilinguals. Based on Guion (2003)

Guion (2003:123) says the different vowel space patterns may be caused by the developmental differences between simultaneous bilinguals and early bilinguals based on perceptual discrimination studies. These studies show perceptual reorganization takes place within the first year of life. Her research also suggests that separate vowel categories in simultaneous and early bilinguals exist. The earlier a person is exposed to a language, the greater the chance they have of acquiring and producing native like vowels. Guion's findings are also consistent with Adapative Dispersion Theory as proposed by Lindblom and Maddieson (1988, as cited in Guion 2003). By raising the high vowels, enough space was created to allow for Spanish vowels to exist.

Another important issue regarding phonological duality is that of mergers and near-mergers. Hickey (2004:125) talks about mergers as "the collapse of a phonemic distinction by one sound becoming identical with another wherein later shifts will mean that the merged sounds move together." Hickey (2004:131) shows that near mergers appear when a speaker consistently makes small articulatory differences between items of two lexical sets but cannot distinguish these distinctions auditorily. He then says, "It must be emphasized that the essential crux of the near-merger assumption is that speakers cannot hear the phonetic distinction which linguists tease out in a spectrographical analysis and by examining vowel formants". As we will see, mergers and near-mergers play a large role in vowel perception in both Pijal Media Lengua and Imbabura Quichua.

In section two of this thesis, I provide background and historical information on PML's source languages establishing the long history of contact and influence between Quichua and Spanish in Ecuador. Here I include information pertaining to the Quechuan

language family and its arrival to Ecuador, demographics of Ecuadorian Quichua, and the influences Spanish and Quichua have had on each other. In section three, I provide background information on the community of Pijal and the current langauge attitudes, before leading into the grammatical description of PML in section four. In section five, I present the phonemic inventory of PML ahead of vowel space analysis in section six.

2 History and Classification of Quechua

Quechua is an agglutinating language(s) covering a geographical area that extends from southern Colombia to northern Argentina, along the Sierra region of the Andes. The Quechuan family, however, does not follow a continuous path along the Andean cordilleras, and as a result isolated communities formed in Caquetá, Nariño, Putumayo (in the southern highland), Amazonian Colombia, and the province of Santiago del Estero in northern Argentina. Northern Peru also contains isolated groups in the northern coastal and Amazonian regions (Adelaar & Muysken 2004: 168). The Ecuadorian dialect of Quechua, representing 27% of all Quechuan speakers, is isolated from the main linguistic centre of the language family as well.

Quechua was the language of the Incan empire, which reached its greatest expansion in 1520 CE under the Inca ruler Huayna Capac (Adelaar & Muysken 2004:165). The fall of the Incan empire came at the hands of the Spanish between 1532 and 1534. The land comprising of present day Ecuador was the last to be conquered by the Incas and only adopted Quichua as a lingua franca a little over a generation before the Spanish *conquistadores* arrived. During the time of the Spanish colonization, Quechua remained the most important indigenous language for administration, justice and religion. After independence from Spain, Quechua made a brief revival before losing prestige and gradually becoming confined to rural areas (Adelaar & Muysken 2004:167).

The 46 sub-dialects of Quechua range from mutually intelligible to no mutual comprehension whatsoever, indicating the presence of independent languages. However, the total number of languages is still in question (Adelaar & Muysken 2004:168).

2.1 Means for Categorization of the Quechuan Family

The descriptive work produced in the 1960s divided the Quechuan family into two subgroups, Quechua I and Quichua II (QI and QII), based on "the complex character of the phonological and morphological facts and the often subtle formal and semantic shifts that separate the numerous dialects" (Adelaar & Muysken 2004:183-4).

2.2 Key Criteria for Separating Quechua I from Quechua II

The three major distinctions that separate QI from QII are lexical, morphological and phonological factors found throughout the Quechuan dialects. The morphological examples are far more transparent than the lexical examples, however, one lexical example contrasts the QI and QII root verb 'to go' (Adelaar & Muysken 2004:188):

(1) QI: *ajwa-*
QII: *ɾi-* / *li-*

2.2.1 Phonological Arguments

- Reflexive *-aja-* before a glide (Adelaar & Muysken 2004:190).

(2) QI: -aja- → -ā- / ___ glide
QII: Retained

- Vowel length (Adelaar & Muysken 2004:190).

(3) QI: Distinctive vowel length
QIIB/QIIC: No distinction

2.2.2 Morphological Arguments

Adelaar and Muysken (2004:189) state that the best known morphological feature for comparison is the "shape of the first person marker for subject and possessor."

(4) QI: V̆# → V̄# (where V# represents a root ending in a vowel)
QII: -j (nominal and verbal) or –ni (exclusively verbal)

Other documented examples of morphological distinctions are as follows:

• The shape of the same-subject converb, which refers to identical subjects in the switch reference system (Adelaar & Muysken 2004:189).

(5) QI: *-r* ([ɾ])
QII: *-ʃpa*

• The shape of the locative case marker (Adelaar & Muysken 2004:189).

(6) QI: *-ʧ̣aw*
QII: *-pi*

• The shape of the ablative case marker (Adelaar & Muysken 2004:189).

(7) QI: *-pita /-piq(ta)*
QII: *-manta*

• Past participle morphemes:

(8) QI/Pacaraos: -nʸak : *paraʃanʸak* 'it was raining'
QII: -ʃka: *paraʃaʃka* 'it was raining'[10]

2.3 Quechua Vowels

Proto-Quechua is believed to have had a three vowel system containing */i/, */a/ and */u/ (Adelaar & Muysken 2004:195). The majority of Quechuan linguists agree that the Proto-Quechuan vowel system only contained short vowels. Adelaar and Muysken (2004:195) say that if vowel length were a feature, it would have been marginal.

The majority of dialects have preserved the three vowel system; however, the influence of Spanish, and its five vowel system, has introduced /e/ and /o/ into a variety of dialects (Orr & Longacre: 1968:532). Heggarty (2005) says that this system is most prevalent among bilingual speakers.

[10] Quichua (QIIB) /tamiaʃka/

2.4 QIIB

Quechua II is divided into three branches QIIA, QIIB and QIIC. The northern Quechuan IIB dialects of Ecuador and Colombia have undergone a drastic transformation in their morphology, which is still preserved in both Peru and Bolivia (Adelaar & Muysken 2004:187). The most overt of these transformations is the loss of the personal reference markers that indicate possession of nouns and specify the patient of verbs (Adelaar & Muysken 2004:186).

2.5 Quichua from Lingua Franca to Dominant Mother Tongue of Ecuador

Under the reign of Huaina Capac, Quechua was introduced to the region that comprises modern day Ecuador in 1470. However, when the Incas invaded new territories, language reform was never part of their agenda (Gómez-Rendón 2008:175). Local populations, as a result, were able to maintain their native vernaculars.

It has been difficult for historians and linguists alike to understand how Quechua was able to change from a lingua franca to, by the time the Spanish conquered in 1532, the mother tongue of the Northern Empire. Torero (2003:93-105, as cited in Gómez-Rendón 2008:175) suggests that Quechua may have been brought to present day Ecuador almost a century before the Inca invasion by the *Mindalaes* (long distant traders) (Gómez-Rendón 2008:175). It is evident that, by the end of the XVI century, local languages were still spoken throughout Ecuador. In 1593, the Quito Synod ordered the preparation of catechisms and confessionaries in the local languages: Pasto, Cara, Panzaleo, Puruhá and Jivaroan varieties, though, the actual catechisms and confessionaries have not been found (Adelaar and Muysken 2004:392). Gómez-Rendón

(2008:176) suggests that these pre-Inca languages were maintained until the mid-seventeenth century when the locals finally adopted Quichua as their mother tongue. Adelaar and Muysken (2004:394) suggest that the only residual evidence of these languages lies in the labial dental /f/ of the Cara language, which exists in a variety of Quichua dialects. This innovation can be found as an allophonic variation in Imbabura Quichua in many of the common initial /p-/ lexemes:

Quichua	Imbabura Pronounciation	Common Quichua Pronounciation	Gloss
panka	ˈfanga	ˈpanga	'leaf'
piña	ˈfiɲa	ˈpiɲa	'angry'

Table 3: /p/ produced as [f] in IQ

The Spanish believed that converting the indigenous populations to the Christian faith would be more manageable if the population only spoke one Lingua Franca. The debate as to whether Quichua was an adequate language for evangelization, due to its supposed inability to "transmit theological concepts", continued until the 1770s when its usage was condemned (Gómez-Rendón 2008:176).

2.6 Ecuadorian Quichua

So when did Quechua become Quichua? If Quechua gradually replaced the native languages of present day Ecuador in the mid-seventeenth century and did not become the mother tongue of the Andean pueblos for another generation, it is, according to Gómez-Rendón (2008:177), impossible to "speak of Ecuadorian Quechua as a distinct variety before the end of the seventeenth century". Did an oral Lingua Franca among a large linguistically diverse population also imply simplification or koineization? Muysken (forthcoming, as cited in Gómez-Rendón 2008) investigated early grammatical descriptions of Ecuadorian Quechua, which demonstrate that the Northern Andean

variety maintained many features of the Peruvian dialects throughout the seventeenth century. However, since the standard model of Quechua was Cuzco Quechua, it is possible that the grammatical descriptions were only slightly altered to cater to the Ecuadorian variety. Nevertheless, innovations throughout subsequent centuries gradually replaced these features (Gómez-Rendón 2008:178).

Several changes may in fact appear to be simplifications of the southern Peruvian variety. These include "the lack of distinction between inclusive and exclusive pronouns" and the "loss of possessive pronominal forms and their replacement by pronoun-genitive constructions", as illustrated in (9)-(10) (Gómez-Rendón 2008:178). It should also be noted that this particular innovation was not caused by contact with Spanish or substratum influence (Gómez-Rendón 2007:484).

(9) Ayacucho Quechua (Adelaar and Muysken 2004:208)
wasi-**jki**
house-*2.POSS*
'Your house'

(10) kan-**ba** wasi
2-GEN house
'Your house'

"The loss of verb-object agreement markers" as illustrated in (11)-(12) (Gómez-Rendón 2008:178).

(11) Argentinean (Santiago del Estero) Quechua (Adelaar and Muysken 2004:208)
tapu-**su**-ngu
Ask-*2-3.OBJ*
'They ask you.'

(12) Ecuadorian Quichua (Lema 2007:163)
kan-da maɲa-n
2-ACC ask-3.PRES
'They/(s)he ask you.'

Gómez-Rendón (2008:178) says that in "1884, Cordero published a Quichua grammar dictionary in which the transitional pronominal form *–wa*" was maintained as an optional first and second person object marker and the possessive marker on possessums was an optional alternative to the genitive construction.

The current dialects of Ecuadorian Quichua have reduced the versatility of the transitional pronominal form *–wa*[11], which is only maintained as a first person singular object pronominal.

(13) Ecuadorian Quichua
janapa-**wa**-n-gi
help-*1sg.ACC*-PRES-2sg
'You help me.'

2.7 Demographics of Ecuadorian Quichua

The dialects of Ecuador (QIIB) are typically separated into two macro-dialects known as Highland Quichua and Lowland Quichua. Any speaker of Quichua living above 2,000 metres is considered a speaker of Highland Quichua. Highland Quichua speakers greatly outnumber lowland speakers. Nine of the ten provinces along the Andean cordillera are home to the Highland dialect. These include: Imbabura, Pichincha, Cotopaxi, Tungurahua, Chimborazo, Bolívar, Cañar, Azuay and Loja. It is reported that the province of Carchi is Spanish monolingual (Gómez-Rendón 2008:169).

According to the social statistics and indicators of the *Instituto Nacional de Estadística y Censos* (National Institute for Statistics and Census, INEC), as of the 2010 census, Ecuador had a total population of 14,306,876 habitants (INEC 2010), which includes an estimated 2,100,000 indigenous speakers, of which an estimated 1,500,000 are speakers of Highland Quichua (Gómez-Rendón 2008:170-171).

[11] This thesis will refer to '-wa' as a the first person direct object maker instead of a transitional pronominal.

81.9% of the population of Imbabura speaks Quichua as a native language, ranking it second among the four most densely populated provinces of Quichua speakers (Chimborazo ranks first with 91.9%). Gómez-Rendón (2008:183) says that provinces with more remote pueblos, like Bolívar, tend to speak a more conservative variety of Quichua due to the lack of electrical access, which implies limited access to radio and television broadcasting in Spanish and more constant communication with mainstream Spanish-speaking society. The provinces of Imbabura, Cotopaxi and Tungurahua have a higher frequency of language innovation, evident in Spanish lexical and structural borrowings within these varieties of Quichua. Gómez-Rendón (2008:184) says the most common means of borrowings are though Spanish language broadcasting and day-to-day interactions with the Spanish speaking population.

It is also worth mentioning that the majority of L1 Quichua speakers, 32.5%, have an advanced level of bilingualism, while simultaneous bilinguals only make up 0.6% of the total population (Büttner 1993, as cited in Gómez-Rendón 2008:172). Quichua monolinguals make up only 8.7% of the population, and tend to be older inhabitants who live in altitudes above 3200 m (Büttner 1993, as cited in Gómez-Rendón 2008:174). L1 Spanish speakers from indigenous backgrounds living in Quichua speaking communities make up 28.38% of the population, where 10.4% are complete L1 Spanish monolingual, followed by 24% with a rudimentary knowledge of Quichua as their L2 (Büttner 1993, as cited in Gómez-Rendón 2008:174). Pijal Media Lengua speakers, on the other hand, typically have an advanced level of trilingualism, with PML and Quichua simultaneously acquired as L1s and Spanish typically learned in school as an L2.

2.8 Spanish Influences on Ecuadorian Quichua

It is documented that nearly every semantic field, "from kinship and household to religion, education and administration" is influenced by Spanish lexical borrowings. The degree of influence varies from dialect to dialect and is less prominent in regions that receive less contact with urban centres (Gómez-Rendón 2008:179). Older generations are also more conservative with respect to lexical borrowings than younger ones.

In provinces with more infrastructure, such as Imbabura and Tungurahua, they now broadcast radio stations in Quichua. Television news in Quichua is also broadcast in the capital on a daily basis. These "atypical communicative settings have induced a number of structural changes in the language" (Gómez-Rendón 2008:179).

All voiceless phonemes in Quichua have a voiced counterpart and are considered, in traditional phonology, as allophonic variants in post-nasal position /p/ → [b](or [β]), /t/ → [d], /k/ → [g] and /s/ →[z], as illustrated in table 4. Spanish loanwords in the core vocabulary of Quichua have expanded the number of possible positions where voiced obstruents may appear at the lexical level, as illustrated in table 5.

Voiceless Obstruent → Voiced / Nasal___

Quichua	IPA	Gloss
pampa	ˈpamba	'plain, prairie'
kanka	ˈkanga	'you' (subject)
chaymanta	ʧajˈmanda	'that's why'
ansa	ˈanza	'dark'

Table 4: Quichua voiced post nasal allophones

Voiceless Obstruent → Voiced / Vowel___

Quichua	IPA	Derivation	Gloss
Manavali	manaˈbali	Q *mana* 'no' SP *vale* /bale/ 'useful'	'useless' (Lema 2007:13)
Azutina	azuˈtina	SP *azotar* 'to whip' Q –na 'INF#'	'to whip' (Cornejo1967:26)
caballochupa	ca**b**aʒ**o**ˈʧupa	SP *caballo* 'horse' Q *chupa* 'tail'	'pony tail' (Lema 2007:13)
Consegrana	conseˈ**g**rana	SP c*onsegrar* 'consecrate' Q –na 'INF#'	'to consecrate' (Cornejo 1967:26)

Table 5: Spanish influenced voiced obstruents

Gómez-Rendón (2008:187) says that the "Quichua noun phrase has experienced two noticeable changes as a result of contact with Spanish": the use of the determiners *ʃuk* 'one', *kaj* 'this' and *ʧaj* 'that', instead of the traditional topic marker *–ka* and replacing Quichua diminutives and augmentatives with their Spanish counterparts.

Diminutives		Augmentatives	
Quichua	Spanish	Quichua	Spanish
-ku / -wa	*-ito*	*-puɾa*	*-isimo*
-ku / -wa	*-ita*	*-puɾa*	*-isma*
-ku / -wa	*-cito* /sito/	*-sapa*	*-ote / -ón*
-ku / -wa	*-cita* /sita/	*-sapa*	*-ota / -ona*

Table 6: Spanish and Quichua Diminutives and Augmentatives

An example of this is the Spanish diminutive ending *-ito* in the Quichua word *piˈʧito* 'small'. Another morphological borrowing is the Spanish agentive suffix *–dor* as *–dur*. This morpheme is found in both Spanish borrowings and native Quichua lexemes i.e., Q *mididur* ← SP *medidor* 'meter/gauge'; and Q *ɲawˈpadur* 'representative' (Gómez-Rendón 2007:484-5).

Gómez-Rendón (2008:187) also mentions that several Spanish quantifiers co-exist with Quichua quantifiers:

Spanish	Colloquial Quichua	Unified Quichua[12]	Gloss
todito	*tuditu*	*Tukuj*	'all'
alguno	*algunu*	*Wakin*	'some'

Table 7: Spanish Borrowed Quantifiers

Lexical borrowings also include the modal verbs (Gómez-Rendón 2007:496):

Spanish	Colloquial Quichua	Unified Quichua	Gloss
menester /menesˈterɾ/	miˈniʃti	muˈtsuna	'to need'
poder /poˈderɾ/	*pudi*	uˈʃana	'can'

Table 8: Spanish Borrowed Modal Verbs

Spanish intonation patterns relating to yes/no questions inverted subject-verb order and echo questions have influenced Quichua to such a degree that the yes/no interrogation marker *–ʧu* is losing ground to an intonational rise toward the end of the question.

Contact with Spanish is also apparent at the syntactic level of Ecuadorian Quichua. Spanish syntactic borrowings are noticeable in all the dialects of Ecuador; however, the percentage of borrowings varies from province to province and even within idiolects. The following examples have been attested in the province of Imbabura (Gómez-Rendón 2007):

(14) The loss of distinction between the comitative morpheme *–ntin* and instrumental morpheme *–wan* with the latter replacing the former (Gómez-Rendón 2007:486).

(16a) Unified Quichua (Ainanguano 2010:14)
tajata-**ndin** ʧuɾi-**ndin** wasi-man ɾi-nka
father-**COM** son-**COM** house-ABL go-3.PAST
'The father went to the house with his son.'

[12] Unified Quichua is the official variety which was adopted in 1980 at a meeting of Quichua speakers from different regions of Ecuador (King 2001:93). Although there are many disparities between the colloquial varieties and unified variety, perhaps the most noticeable variations concern lexicon. There are numerous 'new' words, which are foreign to speakers of colloquial Quichua. Many of these neologisms were created to replace Spanish loan words. King (2001:93) also states "Unified Quichua also employs grammatical features that 'colloquial Quichua' does not" e.g., making case markers like '*–ta'* obligatory when they are optional in 'authentic' varieties. Finally, speakers of Unified Quichua tend to pronounce words as they are written e.g., *tanta* /tanta/ 'bread' and not /tanda/.

(16b) Colloquial Quichua
tajata-Ø ʧʃuɾi-**wan**-mi wasi-man ɾi-nga
Father-POSS son-**COM**-VAL house-ABL go-3.PAST
'The father went to the house with his son.'

(15) The increased usage of the plural marker *–kuna* after numerals in Imbabura Quichua (Gómez-Rendón 2007:486).

(15a) Colloquial Quichua (consultant 66)
hambi-ka pusak hambi-kuna-ta-mi obia-na ni-ɾka
cure-TOP eight cure-PL-ACC-VAL take-INF say-3.PAST
'He/She said to the cure is to take eight pills/remedies'.

(15b) Unified Quichua
hampi-ka pusak hampi-ta-mi opia-na ni-ɾka
cure-TOP eight cure-ACC-VAL take-INF say-3.PAST
'He/She said to the cure is to take eight pills/remedies'.

(16) The merger of the alienable (*-pak*) and inalienable (*-yuk*) possessor morphemes into the former (Gómez-Rendón 2007:486).

(16a) Ecuadorian Quichua (consultant 67)
kaj-manda maʃi-ka wasi-juk-mi
This-ABL friend-TOP house-DOM-VAL
'This here is my friend's house.'

Other structural influences include the usage of *dizi-*, derived from the Spanish verb decir 'to say, to tell', in reported speech and quotatives. Several Spanish modal verbs are also used as verb roots without their infinitive endings (Gómez-Rendón 2008:187).

(17) Quotative evidential (Gómez-Rendón 2007:496)
ʧaj-ka kutiʧi-n "*estoy buscando mi yunta de bueyes*" **dizi**-n
that-TOP answer-3.PRES [I am looking for my yoken of oxen] **QUOT**-3.PRES
'They/(s)he answers "I'm looking for my yoke of oxen'

(18) Reportative evidential (Gómez-Rendón 2007:496)
patɾun da-ʃka ɾumi-ka kuɾi ka-ʃka **dizi**-n
boss give-PP stone-TOP gold be-PP **REP**-3.PRES
'It was said that the rock the landlord gave [to him] was of gold.'

Gómez-Rendón (2008:188) also argues that "traditionally Quichua uses a nominalization strategy for clausal subordination". See (19). And yet, due to the influence of the Spanish model of subordinate clauses, independent clauses appear linked by Spanish connectors such as *que* /ke/ 'that' or *lo que* /lu ki/ 'that which'. Other conjunctions, such as Spanish *porque* /porˈke/ 'because' and *si* 'if', have been borrowed in Quichua as *purki* and *si* respectively.

(19) Unified Quichua (Gómez-Rendón 2008:188)
chaja-ʃpa pay-kuna muna-ʃka-ta apa-ʃka-n
arrive-SSC 3-PL want-PP -NOM/ACC take-PP -3.PRES
'Upon arrival, they took what they wanted.'

(20) Spanish
a la ɟegada, ejos tom-aron **lo ke** ke-ɾian
prep DET.F arrival 3p take-3p.PAST **that which** want-COND
'Upon arrival, they took what they wanted.'

(21) Colloquial Quichua (Gómez-Rendón 2008:188)
chaj-ʃpa paj-kuna apa-ʃka-n **lo ke** muna-ʃka-n
arrive-GER 3-PL take-PP -3.PRES **that which** want-3.PRES
'Upon arrival, they took what they wanted.'

(22) Unified Quichua
ɲuka-pa wasi-man-mi ɾi-ku-ni, kaja punʒa ʒankan-ʃa
1-POSS house-DIR go-PROG-1.PRES tomorrow day work-1.FUT
'I am going home [because] I will work tomorrow.'

(23) Spanish
ɟo est-oi i-endo a mi kasa poɾke tɾabaxa-re maɲana
1 be-1.PRES go-PROG DIR 1.POSS house because work-1.FUT tomorrow
'I am going home because I will work tomorrow.'

(24) Colloquial Quichua
ɲuka-pa wasi-man ɾi-ku-ni **puɾki** kaja punʒa ʒanka-ʃa
1-POSS house-DIR go-PROG-1.PRES **because** tomorrow day work-1.FUT
'I am going home because I will work tomorrow.'

(25) Unified Quichua
kan kaja-**kpi**-ka ɲuka-piʃ kaja-j-man
2 call-**DS.COND**-TOP 1-too call-1-COND
'When you call, I will call too.'

(26) Spanish
si tu ɟam-as, ɟo ɟam-aɾia tambien
if 2 call-2.PRES 1 call-1.COND too
'If you call, I will call too.'

(27) Colloquial Quichua (consultant 65)
si kaj-manda ʒugʃi-ngi ʧiɾi-ta-mi ʧaɾi-ngi.
if here-ABL leave-2.PRES cold-ACC-VAL have-2.PRES
'If you leave here, you will be cold.'

Other Spanish borrowings in Quichua include *y* 'and', *o* (/u/) 'or', *sinu* 'if not' and *pero* [/ˈpiɾu/] 'but' (Gómez-Rendón 2008:188). Adverbs and discourse markers that co-exist with native Quichua words include:

Colloquial Quichua	Spanish	Unified Quichua	Gloss
/aˈura/	*ahora* /aˈoɾa/	ˈkunan	'now'
/inˈtunsis/	*entonces* /enˈtonses/	ʧajˈmanta	'so'
/ˈsimpɾi/	*siempre* /ˈsiempɾe/	wiɲaj	'always, forever'

Table 9: Co-exsiting Spanish and Quichua Adverbs

Other loan words co-existing with native Quichua words include the days of the week, months, times of the day and numbers.

2.9 Quichua Influences on Ecuadorian Spanish

Both at the lexical and syntactical levels, Ecuadorian Spanish especially throughout the highlands has experienced its share of borrowing from Quichua. Older generations show a higher level of lexical borrowing than younger generations. However, such borrowings are still quite common in everyday speech. Normally lexical borrowings co-exist with native Spanish words, although, certain words have even replaced traditional Spanish lexemes:

Ecuadorian SP	Peninsula SP	Colloquial Quichua	Gloss	Frequency of Usage
chuchaqui /ʧuˈʧaki/	*resaca* /ɾeˈsaka/	/ʧuˈʧaki/	'hangover'	Complete replacement
cuy /ˈkui/	*cobayo* /koˈbaʝo/	/ˈkui/	'guinea pig'	Complete replacement
choclo /ˈʧoklo/	*maíz* /maˈːis/	/ˈʧuklu/	'corn'	Equal use given to both
chompa /ˈʧumpa/	*chaqueta* /ʧaˈketa/	/ˈʧumpa/	'jacket'	Equal use given to both

Table 10: Quichua Borrowings in Ecuadorian Spanish

Types of lexical borrowing include both compounds, of Spanish and Quichua lexemes and complete borrowing of Quichua lexemes:

Ecuadorian SP	Peninsula SP	Derivation	Gloss
gallina-runa /gaˈʝina ˈɾuna/	*gallina del campo* /gaˈʝina del kampo/	SP *gallina* /gaˈʝina/ Q /ˈɾuna/ 'man, indigenous'	'a hen raised in a rural area'
tripa-mishki /ˈtripa ˈmiʃki/	No equivalent (native food dish)	SP *tripa* /ˈtɾipa/ 'tripe' Q /ˈmiʃki/ 'delicious, sweet'	'a food dish made of pig tripe'

Table 11: Compound Lexical Borrowings

Examples of complete lexical borrowings include:

Complete Lexical Borrowings			
Ecuadorian SP	Peninsula SP	Colloquial Quichua	Gloss
[13]Food Names			
locro /ˈlokɾo/	*sopa de patatas*	/ˈlukɾu/	'potato soup'
Mote	*maíz descascarillado* deskaskaɾiʝˈado	/ˈmuti/	'hominy'
llapingachos /japinˈgaʧos/	Non Existent	/ʒapinˈɣaʧu/	'a meal consisting of potato patties, sausage, egg and avocado'
yaguarlocro /jawaɾˈlokro/	Non Existent	/jawaɾˈlukru/	'blood potato soup'
taxo /ˈtakso/	*curuba* /kuˈɾuba/	/ˈtaksu/	'banana passionfruit'
morocho /moˈɾoʧo/	*maíz blanco* /maˈiz ˈblanko/	/muˈɾuʧu/	'a type of white dried corn'
chirimoya /ʧiɾiˈmoja/	*cherimoya* /ʧiɾiˈmoja/ (from Quechua)	/ʧiɾiˈmuja/ or [ʦiɾiˈmuja]	'chirimoya (fruit)'
Body Parts			
Pupo	*ombligo*	/ˈpupu/	'belly-button'
shungo /ˈʃungo/	*corazón* /koɾaˈson/	/ˈʃungu/	'heart'

[13] The quantity of food borrowings are extensive and a complete list is beyond the scope of this thesis.

Complete Lexical Borrowings			
Ecuadorian SP	Peninsula SP	Colloquial Quichua	Gloss
rinri /ɾinɾi/ or /ɾinʒi/	oreja /oˈɾexa/	/ˈɾinɾi/	'ear'
*uma (*as in *umasapa)*	*Cabeza*	Q /ˈuma/ 'head' Q –/ˈsapa/ 'AUG marker'	'hard-headed/ thick headed'
Kinship terms			
huahua /ˈwawa/	*niño* /ˈniɲo/ *niña* /ˈniɲa/	/ˈwawa/	'child'
huambra /ˈwambra/	*joven* /ˈxoben/	/ˈwambra/	'youth, adolescent'
taita	*padre* /ˈpadɾe/	/ˈtaita/	'father'
[14]*ñaña* /ˈɲaɲa/	*hermana* /eɾˈmana/	/ˈɲaɲa/	'sister'
guarmi /ˈwaɾmi/	*~bien hecho* /ˈeʧo/	/ˈwaɾmi/ 'woman'	~'well done' Lit : 'someone who does things correctly'
kari as in *karishina* /kariˈʃina/	*~mal hecho* /ˈeʧo/	/ˈkaɾi/ or /ˈhaɾi/ 'man'	~'poorly done' Lit: 'done like a man'
Interjections			
ananay /anaˈnai/	*¡qué lindo!* /ˈke ˈlindo/	/anaˈnai/	'how pretty!'
apuchica /aˈpuʧika/	*¡carajo!* /kaˈɾaxo/	/apuˈʧika/	'darn it!'
atatay /ataˈtai/	*¡qué asco!* /ˈke ˈasko/	/ataˈtai/	'disgusting!'
ayayay /aiˈaiai/	*¡qué dolor!* /ˈke doˈloɾ/	/aiˈaiai/	'ouch!'
achachay /aʧaˈʧai/	*¡qué frío!* /ˈke ˈfrio/	/aʧaˈʧai/	'it's cold!'
arrarray /araˈrai/	*¡qué calor!* /ˈke kaˈloɾ/	/aʒaˈʒai/	'it's hot!'
Common words			
qushqui /ˈkuʃki/	*dinero, plata* /diˈnero/	/ˈkuʃki/ or [ˈkulki]	'money, silver'
shunsho /ˈʃunʃo/	*tonto*	/ˈʃunʃu/	'idiot, stupid'
mushpa /ˈmuʃpa/	*idiota*	/ˈmuʃpa/	'idiot, stupid'
guango /ˈuango/	*~puñado* /puˈɲado/	/ˈwangu/	'a type of measurement' ~ 'a fist full'
pachamama /paʧaˈmama/	*madre tierra* /ˈmadɾe ˈtiera/	Q /ˈpaʧa/ 'Earth'	'Mother Earth'
cacho /ˈkaʧo/	*cuerno* /ˈkueɾno/	/ˈkaʧu/ 'horn'	'type of bread shaped like a pair of horns'

[14] Ecuadorian Spanish has also expanded the usage of *ñaña* to the masculine form *ñaño* to mean 'brother', which does not exist in Quichua (Quichua: *pani* or *wawki*).

Complete Lexical Borrowings			
Ecuadorian SP	Peninsula SP	Colloquial Quichua	Gloss
chaquiñán /ʧakiˈɲan/	*camino de pie* /kaˈmino de pie/	Q /ˈʧaki/ Q /ˈɲan/	'foot trail'
cuychi /ˈkuiʧi/	*arcoiris* /aɾkoiɾis/	/ˈkuiʧi/	'rainbow'
tullpa /ˈtuʃpa/	*fogata* /foˈgata/	/ˈtuʒpa/ or [ˈtulpa]	'fire for cooking'

Table 12: Complete Lexical Borrowings

Due to centuries of colonization and repression, many Quichua lexemes have become pejoratives in colloquial Spanish. Several examples include:

Ecuadorian SP	Colloquial Quichua	Gloss
longo (M); *longa* (F)	/lungu/ 'youth, adolescent'	'indian'
runa /ˈruna/	/ˈruna/ 'man, indigenous'	'from the countryside'
chapa /ˈʧapa/	*chapana* /ʧaˈpana/ 'to be vigilant'	'derogatory term for police officers , similar to 'pig''

Table 13: Quichua Borrowings Used as Spanish Pejoratives

Quichua has influenced Ecuadorian Spanish phonemically as well. In the Andean region of Ecuador it is quite common outside the capital (and within to a certain extent) to find both the palatal fricative /ʝ/ and trill /r/ pronounced as the voiced alveolar-palatal /ʒ/:

Peninsula SP	Ecuadorian SP	Media Lengua/ Relexified Quichua	Gloss
carro /ˈkaro/	*carro* /ˈkaʒo/	/kaʒo/	'car, bus'
ella /ˈeʝa/	*ella* /ˈeʒa/	/eʒa/	'she' (3.F)

Table 14: Quichua Phonemic Influences

Syntactic borrowings include the commonly used phrase *deme* 'give me' + the gerund form of the following verb as illustrated in examples (28) – (30), derived from the Quichua phrase: Verb+*ʃpa* (Verb+SSC) and *kuna* 'give'.

(28) Spanish
de-me as-iendo eso
give.IMP(formal)-1DO do-GER that
'Please do that for me.'

(29) Quichua
ʧaj-ka ɾuɾa-ʃpa ku-paj
that-TOP do-SSC give-IMP(formal).
'Please do that for me.'

(30) Spanish
da-me tɾa-ɟendo el libɾo
give.IMP(informal)-1DO bring-GER DET.M book
'Bring me the book.'

(31) Quichua
kamu-ta apamu-ʃpa ku-j
book-ACC bring-SSC give-IMP(informal)
'Bring me the book.'

3 Pijal, Imbabura, Ecuador

Section 2 established the long history of contact and influence between Quichua and Spanish. It also shows how the *lingua franca* variety of Quechua gradually replaced other Pre-Incan languages as the principal language of Ecuador for the indigenous populations, while data from Adelaar and Muysken (2004) show the split from the Peruvian branches through a variety of innovations. A recurring topic in section 2 is the amount of linguistic innovation which took place, and still takes place, in Ecuadorian Quichua. Some 400 years after the Spanish colonized modern day Ecuador, these innovations jumped to a whole other level with the emergence of Media Lengua.

There is no written documentation about the development of Pijal Media Lengua. Based on statements from elder speakers of PML as well as estimates based on their age, which child they are (first, middle, last born) and the typical birthing age, it appears that PML developed as a distinct variety of ML or was introduced to Pijal by the beginning of the 20th century and was definitely used as an L1 during the 1910s.

3.1 Background Information on Pijal

Pijal is a community located in the González Suárez parish of Imbabura. It has an estimated population of 600 inhabitants and the majority are descendants from the Kayambi pueblo. Spanish is the primary language spoken today in Pijal, but the majority of adults also speak Quichua as an L1, while the younger generations are often Spanish monolinguals. Media Lengua was the mother tongue along with Quichua until its usage was condemned by literacy groups in an attempt to rid Ecuador of illiteracy in the mid-to-late 1980s. Today PML is only spoken by adults aged 35 years and above.

The people of Pijal typically make their livelihood through agriculture, the elaboration of handicrafts and recently through their community tourism project *Sumak Pacha*. The community-based program offers a variety of activities for international and national tourists including hikes, visits to nearby waterfalls and native forests, family living, reenactments of traditional festivals, traditional food, organic and traditional agricultural techniques, natural medicinal plants and traditional curing techniques.

Ten years ago, Pijal had an estimated illiteracy rate of 40%. Community officials today believe it is below 10%. There are three schools, one kindergarten, and no high school (students usually have to go to Otavalo for secondary education). Those that attend university typically go to Quito, Otavalo or Ibarra.

While the nearest hospital is in Otavalo, the locals prefer to practice traditional rituals with medicinal plants. There is no police station or patrols in Pijal. Instead the community members practice traditional indigenous justice. Pijal has virtually no crime.

> "Unfortunately, very few official historical records are available which lay out the history of Pijal. What is known has mostly been passed down by word of mouth, and contradictions about the facts exist even amongst elders."
>
> -Johnson (2009)

3.2 Statements from Pijal

The following statements were given by (1) the community representative and president of *Sumak Pacha,* Don Antonio Maldonado, (2) a political representative from González Suárez, (3) one of the elders Doña Anita Cañarejo and (4) Don Luis Bonilla, a member of *Sumak Pacha*. This section also includes the opinions of the younger

generations and the current status of the language. Many of these statements took place during casual conversation. The speakers' identities will remain anonymous.

Statements:

Don Antonio Maldonado, age 60 and president of Sumak Pacha, said that both his parents and grandparents spoke Media Lengua and Quichua. He also said that through intercommunity marriages in the 1950s and 60s, PML spread, to a degree, to the nearby community of Angla and two other nearby communities, that to this day, continue to utilize the language. Like the rest of the community members he was unsure of the language's origin. He also mentioned that one of the elders, who had just passed away at the age of 98, spoke PML as his native language.

A political representative from González Suárez, who wishes to remain anonymous said:

> *"At the beginning of 20th century the population of Pijal Bajo received an influx of indigenous emigrants from the province of Cotopaxi. This can be seeing in peoples' last names like: Chicaiza, Toaquiza among others.*"

If this information is in fact true, Pijal Media Lengua could be a variety of Salcedo Media Lengua or vice versa, which would explain some of the similarities discussed in section 4. The political representative also provided this opinion of Media Lengua: *"In Pijal they can't speak Quichua well. It's more like Spanish with parts of Quichua. It doesn't make much sense."*

Don Luis Bonilla, age 40 and a member of *Sumak Pacha*, stated that when his parents married they had communication problems. His mother could only speak Media Lengua and his father Quichua. He recalled arguments where his father would tell his mother to speak correctly.

When asked who in her family spoke Media Lengua[15], Doña Anita Cañarejo, age 62 and member of *Sumak Pacha,* said the following in PML:

"miu abuelitapiʃ ja asiʒata ablanata sabiɾka. miu mamitapiʃ ja asiʒata konbersankaɾka. miu papasupiʃ ja asi konbersankaɾka y asi konbersaʃpami bibin kaɾkantʃi."

"My grandma used to speak just like this as well. My mom used to converse just like this too. My father also conversed just like this. And, that's how they had spent their lives' conversing'.

She had no recollection of how her great-grandmother spoke. She also said her grandmother passed away in 1972.

3.3 Current Language State and Attitude

When my wife and I first arrived to Pijal and began interviewing the community members, they were reluctant to speak Media Lengua. Only after a formal meeting, during which I presented the goals of my thesis, did the consultants begin to use Media Lengua. Once they were comfortable and began to speak freely, we noticed a change in language attitude. Everyone was laughing and having fun with the language. When we asked what was so funny, we were told that Pijal Media Lengua (PML) has a different intonation pattern than Quichua which sounds funny. Other individuals said they hadn't spoken 'like this' in 20 years. Still others said that Quichua sounded monotonous and more formal when compared to Media Lengua. The consultants who knew me would urge me to speak Media Lengua and even corrected me with PML when I would attempt Quichua. When children were present for elicitation sessions, their curiosity was apparent as they would smile and chuckle. Unsuprisingly, the majority of kids had never

[15] I have chosen to represent vowels in ML using a five vowel system based on the conclusions of this thesis and impressionistic observations.

heard their parents speak the language. The children appeared mostly to be curious about the language, and when asked if they would like to someday learn it, they would typically laugh and say "No.". However, the majority of children, though Spanish monolingual, saw Quichua as a language they should learn.

A Spanish monolingual, 20 years of age said "I like when my grandma [who didn't speak Spanish] speaks Media Lengua because I least I can understand what she's saying."

When I asked locals from the nearby city of Otavalo about PML typical answers were "they speak a different Quichua in Pijal" or "I don't understand their Quichua".

Although the PML will most likely be lost in the next few generations, if no revitalization projects are undertaken, the attitude is not a negative one inside the community. It has a position of nostalgia but nothing more.

4 A Brief Grammatical Description of Pijal Media Lengua

Based on a 200 word Swadesh list (Swadesh 1952), PML contains an 89% relexified vocabulary. However, when asked why certain words were commonly used in Quichua, language consultant 43 stated "sometimes people accidently mix in Quichua words, but that's not correct Media Lengua", alluding to the point that, hypothetically, PML should have a 99.9% relexification rate[16]. Nonetheless, the words in table 15 are commonplace in PML and were used by the majority language consultants at one point or another during elicitations.

Pijal Media Lengua	Imbabura Quichua	Ecuadorian SP	Gloss
kusu	kusu	*esposo*	'husband'
warmi	warmi	*mujer* /muˈxeɾ/ or *esposa*	'woman, wife'
hari	hari	*hombre* /ˈombre/	'man'
kunuk	kunuk	*calor* /kaˈloɾ/	'heat'
wawa	wawa	*niño* /ˈniɲo/ (M) *niña* /ˈniɲa/ (F)	'child'
ɾumi	ɾumi	*piedra* /ˈpiedɾa/	'rock'
manʧana	manʧana	*miedo*	'fear'
ʧiɾina	ʧiɾina	*frío* /ˈfɾio/	'freeze'
ʧaki	ʧaki	*pie*	'foot'

Table 15: Quichua Preservations in Media Lengua

4.1 Quichua Preservations and Spanish Gender in PML

Muysken (1997:378) puts forth two hypotheses for why certain lexemes did not undergo relexification. The first is that common Quichua lexical borrowings in Spanish[17] typically appear as Quichua in Salcedo Media Lengua (SML), i.e., it is impossible to tell if SML has 'preserved' a Quichua word or 'reborrowed' a Quichua loan word from Spanish (Muysken 1997:378). See (32)-(33). This also appears to be the case in Pijal Media Lengua (34).

[16] The only word that consistently appeared in a transparently Quichua form in PML is the copula *kana* 'be'
[17] See table 12 for extensive list of Quichua borrowings in Ecuadorian Spanish.

(32) Ecuadorian Spanish
el **wawa/wambra** kosin-a i tex-a
DET.M **child/adolescent** Cook-3.PRES and knit-3.PRES
'The child cooks and knits.'

(33) Salcedo Media Lengua
wawa-ka kuzin-tak i tixa-tak
child-TOP cook-CONJ and knit-CONJ
'The child cooks and knits.'

(34) Pijal Media Lengua
ese **wambra/wawa**-ka konzihun(paʃ) i tixahun
DET **adolescent/child**-TOP cook-PROG-3.PRES and knit.PROG-3.PRES
'The child cooks and knits.'

(35) Quichua
wawa/wambra-ka janu-tak awan-tak
child/adolescent-TOP cook-CONJ knit-CONJ
'The child cooks and knits.'

Muyken's second hypothesis states that certain Spanish words which did not fit the strict penultimate stress and syllabic pattern (ˈCV(C).(C)CV(C)#[18]) of Quichua have a tendency to avoid relexification. This statement holds true for the remaining words in table 15[19]:

Quichua/PML	Spanish	SP Stress y Syllabic Structure	Gloss
/ˈku.nuk/	*caliente* /ka.ˈlien.te/	CV.ˈCVVC.CV	'hot'
/ˈɾu.mi/	*piedra* /ˈpie.dɾa/	ˈCVV.CCV	'rock/stone'
/man.ˈʧa.na/	*miedo* /ˈmie.do/	ˈCVV.CV	'fear'
/ʧi.ˈri.na/	*congelar* /kon.xe.ˈlaɾ/	CVC.CV.ˈCVC	'freeze'

Table 16: Quichua Preservations in ML Based on Syllabic and Stress Patterns

This may have been the case with SML. There are however, many Spanish-derived lexemes in PML that originally had the same foreign stress or syllabic patterns as in table 16.

[18] /k/ is the only consonant found to typically end Quichua nouns while /n/ is the only consonant found in 3rd person present verbal inflections.
[19] Except *wawa* which falls under the first hypothesis of Quichua lexical borrowings in Spanish

Quichua	Spanish	SP Stress y Syllabic Structure	Gloss	PML
ɲu.ˈkan.ʧi	*nuestro*(*a*) /ˈnues.tɾo/	ˈCV̲V̲C.CCV	‘our’	ˈnues.tɾo
ˈja.ku	*agua* /ˈa.gua/	ˈV.CV̲V̲	‘water’	ˈa.ɣua
ˈku.nan	*ahora* /a.ˈoɾa/	V̲.ˈV̲.CV	‘now’	a.ˈora
ˈa.puk, ˈpu.ʃka	*patrón* /pat.ˈɾon/	CVC.ˈ̲CVC	‘boss, landowner’	ˈpat.ɾon

Table 17: Spanish Borrowings in PML with Foreign Stress or Syllabic Patterns

Although foreign stress, syllabic patterns and Quichua borrowings in Ecuadorian Spanish appear to play a role in relexification, there are several other groups that do not undergo this process. These include colloquial expressions, interjections, cultural items with no direct Spanish translation, and lexemes with no exact semantic match in Spanish. There also appears to be a group of words that do not fit the above categories and alternate between Spanish and Quichua with a higher tendency towards the latter. These words are not just part of a small group of idiolects but are also found as synonyms among the majority of consultants. Apparently Muysken's (1997:366) observation that "Media Lengua is essentially the product of replacing the phonological shapes of Quichua stems with Spanish forms" is the precursor to understanding this trend. When the phonological shell of a Spanish-derived lexeme is used in ML it becomes completely devoid of all Spanish features, i.e., number and gender, and undergoes simplification, whether it be by defaulting the morphological gender of Spanish nouns and adjectives (*-o* (M) and *–a* (F)) to a neutral post-masculine form or reducing the more complex family relationships of Quichua to the comparatively less complicated Spanish system. This simplification passes through two filters where (1) the word is first analyzed semantically in Quichua and (2) then receives the phonological shell of the Spanish equivalent based on Quichua semantics. When more complex Spanish nouns (which define gender by the word final morphemes *-o* (M) and *–a* (F)) are passed through the first filter, their translation becomes ambiguous and tends to default to the Quichua word before finally

passing to the second filter i.e., SP *gato/a* → Q *misi* instead of having to deal with the gender distinction. This is evidenced by the higher tendency for Spanish nouns with morphological genders to be rejected for their Quichua counterparts in PML.

Some nouns in PML appear with the correct Spanish gender. These are typically words that encode gender lexically in Quichua and thus require two distinct phonological fillers in order to satisfy the encoded gender of Quichua. The following table presents different variables that may affect relexification (found in italics):

Sex	Spanish Noun	*Quichua*	*Cultural Term*	*Q Borrowing in SP*	*SP Borrowing in Q*	*Syllabic*	*Stress*	*Semantic Distinction*	Typical PML
M/F	estudiante ‘student’	jatʃanakuk	No	No	No	No	No	No	estudiante
F	komida ‘food’	mikui	No	No	No	No	No	No	komida
M	kolor ‘colour’	tulpu	No	No	No	No	No	No	kolor
M	anako ‘Quichuan skirt’	anaku	Yes	Yes	No	No	No	Yes[20]	anaku
M	sombrero ‘hat’	muʧiɣu	Yes	No	No	No	No	Yes[21]	muʧiku
F	tiera ‘earth, land’	alpa	Yes	No	No	DIP	No	Yes[22]	alpa
M/F	χoben ‘adolescent’	wambra (M)	No	Yes	No	No	No	Yes[23]	wambra
		kuitsa (F)	No	No	No	No	No	Yes[24]	kuitsa
Verb	amar, akarisiar ‘love’ ‘caress’	hujana	No	No	No	No	No	Yes[24]	hujana
	aser lindo ‘make pretty’		No	No	No	No	No	Yes[25]	
	karɲoso, amoroso,		No	No	No	No	No	Yes[25]	
M	seɲor ‘mister, sir’	ʃiri (rare)	Yes	No	No	No	No	Yes[25]	runa, tajta
F	seɲora ‘missus, ma’am’	mama	Yes	No	No	No	No	Yes[26]	mama, tia

[20] Both *anaco* /anako/ (SP) and *anaku* refer to the traditional long skirt worn by the women of highland Quichuan pueblos of Ecuador. This garment is distinct from the Spanish work *falda* ‘skirt’ which refers to a typical skirt used in western cultures.

[21] *muʧiɣu* refers to a traditional hat worn by married people in Pijal and surrounding areas.

[22] *Alpa* has a much broader definition in Quichua than *tierra* /tiera/ in Spanish. *Alpa* not only refers to earth, but also to land, soil (in relation to its productive qualities), and portrays a more spiritual relation to the earth. *Alpa* also makes up part of 52 different compounds with different meanings (Aguinda 2008).

[23] Spanish does not fulfill the gender distinction and would create an ambiguous reference to gender with according to Quichua semantics.

[24] *Huyana* can be used as a verb or adjective in Quichua and has a broad list of definitions This appears to be the case for the majority of Quichua verbal borrowing in PML; Q *kana* SP *ser, estar* ‘be’, Q *kanina* SP *morder, pikar* ‘bite’ etc.

[25] After 500 years of colonization, the word *señor* /ˈseɲor/ appears to have become taboo in Quichuan culture and tends to only be used in reference to mestizos or in very formal situations. The same holds true for *señora* /seˈɲora/. The more endearing term, *tia* ‘aunt’ was always used as a relexified alternative. For men, *patrón* /patron/ ‘boss’ and the archaic word *misir* /misir/ ‘mister’ were all used along with *runa* ‘indigenous person’ and *tayta* ‘father’ .

Sex	Spanish Noun	*Quichua*	*Cultural Term*	*Q Borrowing in SP*	*SP Borrowing in Q*	*Syllabic*	*Stress*	*Semantic Distinction*	Typical PML
M	pero 'dog'	alku	No	No	No	No	No	Yes[26]	alku, pero
F	pera 'bitch'		No	No	No	No	No	Yes[27]	alku, pero
M	gato 'cat'	misi	No	Indirectly	No	No	No	Yes[27]	misi, ɣato
F	gata 'female cat'		No	Indirectly	No	No	No	Yes[27]	misi, ɣato
M	niɲo 'boy'	wawa	No	Yes	No	No	No	Yes[27]	wawa
F	niɲa 'girl'		No	Yes	No	No	No	Yes[27]	wawa
M	ʧanʧo 'pig'	kuʧi	No	No	No	No	No	Yes[27]	kuʧi
F	ʧanʧa 'sow'		No	No	No	No	No	Yes[28]	kuʧi
M	profesor 'teacher'	yaʧaʧik/ profesor	No	No	Yes	Yes	Yes	Yes[28]	profesor
F	profesora 'teacher'		No	No	Yes	Yes	No	Yes[29]	profesora
M	ixo 'son'	ʧuri	No	No	No	No	No	No[29]	ixo
F	ixa 'daughter'	uʃuʃi	No	No	No	No	No	No[30]	ixa, uʃuʃi
M	ermano 'brother'	turi	No	No	No	No	No	Yes[30]	ermano
		wawki	No	No	No	No	No	Yes[31]	ermano
F	ermana 'sister'	ɲaɲa	No	No	Yes	No	No	Yes[31]	ermana
		pani	No	No	No	No	No	Yes[31]	ermana
M	toro 'bull'	hariwagra	No	No	No	No	No	No	toro
F	baka 'cow'	warmiwagra	No	No	No	No	No	No	baka
M	ombre 'man'	warmi	No	Indirectly	No	No	No	Yes[31]	warmi
F	muxer 'woman'	hari	No	Indirectly	No	No	No	Yes	hari

Table 18: Variables Affecting Relexification

[26] Using the Quichua term avoids the gender distinction in Spanish.

[27] This holds true for the many Spanish synonyms for 'pig' *puerco(a)* /puerko/, marrano*(a)* /marano/, cerdo*(a)* /serdo/.

[28] This word had become part of the Quichua vocabulary by indoctrination from mestizo teachers.

[29] Both Quichua words require separate phonological shells in ML, *ushushi* /uʃuʃi/ 'daughter' is commonly found in the data.

[30] Quichua has more distinctions for sibling titles than Spanish e.g., a woman's brother is *turi* and a man's brother *wawki* whereas the Spanish word for both is *hermano* /ermano/. This has caused ML to opt for the more simplified Spanish system.

[31] *Warmi* /warmi/ and *kari* /hari/ have broader meanings in Quichua than in Spanish. *Warmi* means, woman, wife, female and as a title for women and female animals along with specific series of inanimate objects. *Warmi* also has 15 compounds with different meanings. The same holds true for *kari* with respect to the male gender save husband. *Kusa* 'husband' appears to be used in PML by proxy of *warmi*.

Quichua Preservations and Spanish Gender Examples in PML:

(36) **Daughter:** Quichua Preservation
miu **uʃuʃi**-ka no aki-pi-ʧu
1.POSS **daughter**-TOP NEG here-LOC-NEG
'My daughter is not here.'

(37) **Sister:** Spanish Gender
mi **ɛrmana**-ka lado-ʒa-mi bibi-n
1.POSS **sister**-TOP next-LIM-VAL live-3.PRES
'My sister just lives next [door].'

(38) **Brother:** Spanish Gender
mi **ermano**-ka lexo lexo bibi-n.
1.POSS sister-TOP far far live-3.PRES
'My brother lives very far away.'

(39) **Dog:** Quichua Preservation
alku-ka ese komida-ta komi-ɾka
dog-TOP DET food-ACC eat-3.PAST
'The dog ate this/the food.'

(40) **Woman:** Quichua Preservation
ese **warmi**-kuna-ka bini-hu-n-mi
DET woman-PL-TOP come-PROG-3.PRES-VAL
'These women are coming.'

(41) **Man:** Quichua Preservation
ese **hari**-kuna bini-ʃka
DET man-PL come-PP
'The men have come.'

(42) **Daughter:** Spanish Gender
miu **ixa** aʒa ‿afuera-pi
1.POSS **daughter** there outside-LOC
'My daughter is over there outside.'

(43) **Child:** Quichua Preservation
mio **wawa**-ka kinse aɲo-ta-mi tini-n
1.POSS **child**-TOP fifteen year-ACC-VAL have-3.PRES
'My child is fifteen.'

Spanish adjectives, which transparently mark gender with –o/a, do not tend to default to Quichua as nouns do. Instead, they default to the singular masculine Spanish

shell. This perhaps provides stronger evidence for the existence of an independent class of adjectives in Quechua, something that has been a topic of debate among Quechuan linguists[32].

Gender Neutral Adjectives:

(44) **White:** with the traditionally feminine word 'molar' in Spanish.
mio muel**a**-kuna-ka blank-**o**
1.PRES molar-PL-TOP white-**M(sp)**
'My teeth are white.'

(45) **Good:** with the traditionally feminine word 'carrot' in Spanish
zanaoɾi**a**-ka buen-**o**-mi nuestɾo oχos-pak
carrot-TOP good-**M(sp)**-VAL 1p.POSS eye-BEN
'Carrots are good for our eyes.'

(46) **Good:** with the traditionally feminine word 'beer' in Spanish
ese seɾbez**a** haja haja-ka no buen-**o**-ʧu
DET beer bitter bitter-TOP NEG good-**M(sp)**-NEG
'This beer is very bitter, [it's] not good.'

(47) **Small:** with the traditionally feminine word 'she' in Spanish
eʒaka mas ʧĩkit-**o**-mi familiamanta
3.F-TOP more small.DIM(sp)-**M(sp)**-VAL family.ABL
'She is the smallest of the family.'

No complete explanation has been presented as to why certain words appear in Quichua instead of Spanish has been presented, making this an interesting area for future research.

[32] Schachter (1985) claims that Quechua adopts a strategy for using nouns and verbs to convey meanings usually handled by adjectives.

4.2 Verbal Derivation

According to Muysken (1997:366), vowels of relexified words commonly undergo phonological assimilation in the following manner[33]:

Original Spanish Vowel	ML Adaptation
a	a
e	i
i	i
o	u
i	i
ie	i
ue	u
ai	ai

Table 19: Traditional View of Vowel Assimilation in ML

Muysken (1997:381) states,

> "We find that /e/ and /o/ are often, but not always produced as /i/ and /u/ respectively (with some variation that also occurs in the [Quichua] pronunciation of Spanish loans). The Spanish vowels [e] and [o] are often retained in names and interjections. In stressed position [e] and [o] are more frequently retained than in unstressed positions. High frequency verbs such as *dizi-* 'say', *azi-* 'do/make', *vini-* 'come' and *pudi-* 'can, be able' are always pronounced with high vowels. By contrast the negator *no* and the singular pronouns *yo* [/jo/] 'I' *bos* 'you' and *el* '(s)he' vary rarely are."

According to Muysken (1997:381) the Spanish diphthongs undergo various degrees of assimulation; /ue/ is sometimes pronounced as /u/, /wi/ or /i/; Spanish /ui/ is pronounced /u/; Spanish /ie/ is pronounced as /i/; and Spanish /ai/, which occurs in native

[33] Spanish diphthong assimilation is based on examples (2) and (14) in Muysken (1997).

Quichua words as well, is typically maintained. Muysken (1997:365) also writes about the adaptation of Spanish verbs to ML. He says "the Spanish irregular verb *vengo* ['I come'] appears in a regularized stem form, *vini*." He also presents a slightly different derivation process than that found in PML, "The mid vowels are collapsed with the high vowels /i/ and /u/ respectively, and the stem vowel is maintained as part of the new root." Muysken (1997:383) states that verbs are derived "from inflected third-person singular or infinitive Spanish forms".

As with SML, PML verbs are formed by removing the Spanish *–r* /ɾ/ in the infinitive endings -*ar* /aɾ/, -*er* /eɾ/ and -ir /iɾ/ and then adding the Quichua infinitive suffix *–na,* e.g., SP *venir* → PML *vinina*. Vowel adaption in PML is more complicated than replacing mid vowels with high- vowels, as I will demonstrate in section six. Unlike SML, PML evidence shows that the infinitive form is the only verb type that is used for verbal derivation. Table 21 presents nine Spanish verbs conjugated in tenses that could potentially render the same Media Lengua root derivation using the traditional view of vowel assimilation presented by Muysken (1997:366) and found in table 19.

English	Spanish	IPA	Infinitive	1s-PRES	3s-PRES	1s-PAST	3s-PAST	IMP	3s-IMPERF	PML Root
Eat	comer	kome	komeɾ	komo	kome	komi	komio	kome	komia	kumi-
Can	poder	poderɾ	poderɾ	puedo	puede	pude	pude	--	podia	pudi-
want	querer	kereɾ	kereɾ	kiero	kiere	kise	kiso	--	keria	kiri-
think	pensar	pensaɾ	pensaɾ	pienso	piense	pense	penso	piensa	pensaba	pensa-
Sit	sentarse	sentarse	sentarse	siento	sienta	sente	sento	sienta	sentaba	senta
have	haber	aberɾ	ɾ	e	a	ube	ubo	--	abia	abi-
count	contar	kontaɾ	kontaɾ	kuento	kuenta	konte	konto	kuenta	kontaba	konta-
Go	ir	iɾ	iɾ	boy	ba	fui	fue	va	iba	i-
See	ver	beɾ	beɾ	beo	be	bi	bio	be	beia	bi-

Table 20: Spanish Verb Conjugation Reference

English	Eat	Can	Want	Think	Sit	Have	Count	See	Go	
Spanish	Comer	Poder	Querer	Pensar	Sentar	Haber	Contar	Ver	Ir	
PML Root	kumi-	pudi-	kiɾi-	pensa-	senta-	abi-	konta-	bi-	i-	
Infinitive	kumi-	pudi-	kiɾi-	pensa-	senta-	abi-	konta-	bi-	i-	✓
1s-PRES	kumu-	pudu-	kiɾu-	pensu-	sentu-	e-	kontu-	beo-	boi-	×
3s-PRES	kumi-	pudi-	kiɾi-	pensa-	senta-	a-	konta-	bi-	ba-	×
1s-PAST	kumi-	pudi-	kisi-	pensi-	senti-	ubi-	konti-	bi-	fui-	×
3s-PAST	kumio-	pudo-	kisi-	pensu-	sentu-	ubo-	kontu-	bio-	fui-	×
Imperative	kumi-	--	--	pensa-	senta-	--	konta-	bi-	bi-	×
Imperfect (root)	kum-	pud-	kiɾ-	pensa-	senta-	ab-	kont-	bi-	i-	×
3s-IMPERF (inflection)	kumia-	pudia-	kiɾia-	pensaba-	sentaba-	abia-	kontaba-	bia-	iba-	×

Table 21: Verb Derivation Deduction

It is also worth noting that diphthongs are quite common in both PML and Imbabura Quichua (IQ) relexified vocabulary. Thus, one would expect to find diphthongs in Media Lengua verbs such as *pudina* 'can' and *kiɾina* 'want', if the third person present was the source of verb derivation:

(48) Spanish *puede* can-3.PRES — PML 3.PRES **puedina* — PML *pudina* can-INF
Spanish *sembɾaɾ* want-3.PRES — PML 3.PRES **siembrana* — PML *sembɾana* want-INF

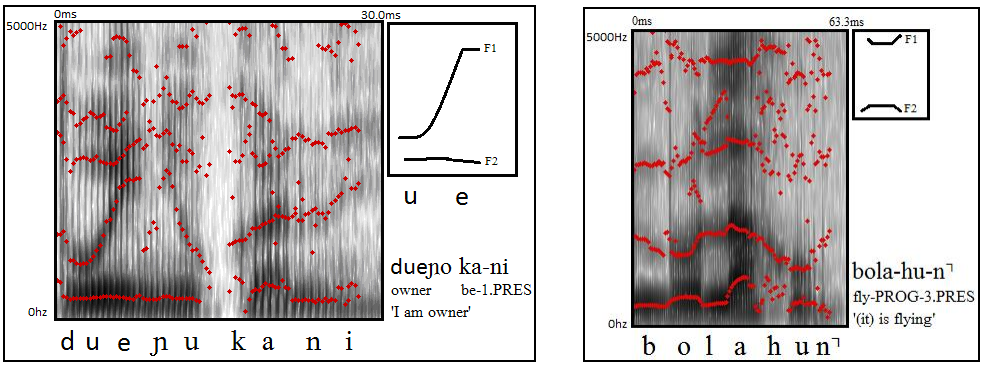


Figure 5: Spectrograms of /ue/ (Left) vs. /u/ (Right)

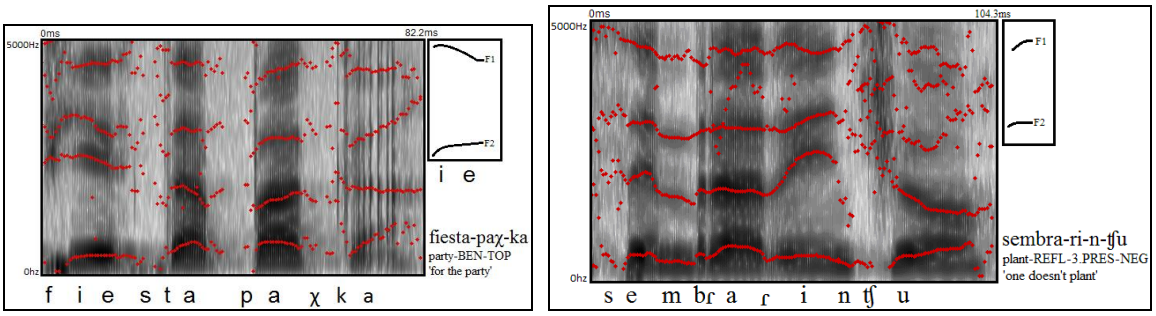


Figure 6: Spectrograms of /ue/ (Left) vs. /u/ (Right)

I have analyzed 558 verbs from my dataset and found no verbal diphthongs which could hypothetically be derived from the 3s.PRES tense. The lexical category 'verb' has not done away with diphthongs either, since they are well preserved in many infinitive forms derived from Spanish, i.e., *kuidaɾ* 'to care for' and *ɾeiɾ* 'to laugh'. Of these examples, the diphthong /ei/ does not occur in traditional Quichua phonotactics.

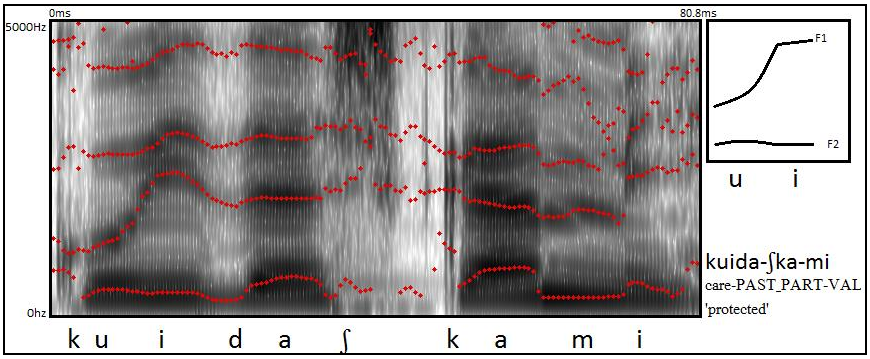


Figure 7: Spectrogram of /ui/ found in the verb *kuidaʃkami* 'protected'

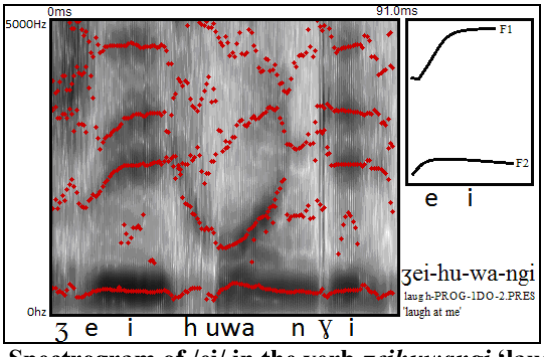


Figure 8: Spectrogram of /ei/ in the verb *ʒeihuwangi* 'laugh at me'

4.3 Word Order

PML, like SML, is primarily an XV language. Like SML, Quichua and Spanish, PML is also a pro-drop language, i.e., it allows sentences to occur without overt subject pronouns. In contrast to colloquial Quichua, where the accustative marker is optional in SVO word order (Gómez-Rendón 2007:512; King 2001:93), every PML sentence in my dataset that contains a direct object takes the accusative marker *–ta*.

(49) PML SOV
jo-ka no debeɾs-ta-ka azi-ni-ʧu
1-TOP NEG homework.PL(sp)-ACC-TOP do-1.PRES-NEG
'I don't do homework.'

(50) PML OV
aʃtu tɾabaxo-ta tini-ni
much work-ACC have-1.PRES
'I have a lot of work.'

(51) PML SVO
ɣato-ka komi-hu-n peskado-ta
cat-TOP eat-PROG-3.PRES fish-ACC
'The cat is eating fish.'

(52) PML VO
kaba-hu-ni ueko-ta
dig-PROG-1.PRES hole-ACC
'I am digging a hole.'

(53) PML OSV
seɾbeza-ta jo-ka kiɾi-hu-ni
beer-ACC 1-TOP want-PROG-1.PRES
'I am wanting a beer.'

The positional relationship between adjectives and nouns typically depends on the structure of the sentence. If the copulative *kana* or validator *–mi* (attached to the adjective with no other verb present, i.e. creating a predicate adjective) is used as a copulative, then the typical structure is NA (i.e. XV):

(54) Copulative: verb construction with validator
mio teʒeno-ka bonito-mi kaɾka
1.POSS land-TOP pretty-VAL be-3.PAST
'My land was pretty.'

(55) Copulative: verb construction without validator
ju-ka demasiado kansa-ʃka ka-ni
1-TOP too tire-PP be-1.PRES
'I'm too tired.'

(56) Copulative: validator construction
ese floɾ amaɾiʒo-wan-mi
DET flower yellow-COM-COP
'This flower is yellow. /this flower is with yellow.'

Other adjectival constructions, with the exception of comparatives and code-switching, typically follow AN order:

(57) AN structure
ese ʧikito wawa-ka pɾeɣunta-hu-n-mi
DET small.DIM(sp) child-TOP question-PROG-3.PRES-VAL
'That small child is asking [a question].'

(58) Comparative
ju-pa kasa-ka mas nuebo-mi ese otɾo besina-pa
1-GEN house-TOP more new-VAL DET other neighbour-GEN
'My house is newer than that other neighbour's.'

(59) Code Switching
kamino-pi-ka aʃto floɾes abi-n puɾo **floɾes amaɾiʒos**
trail-LOC-TOP many flower.PL(sp) exist-3.PRES just flower.PL(sp) yellow.PL(sp)
'There are tons of flowers along the trail, [but] only yellow flowers'

4.4 Voicing Rule

Like SML (Muysken 1997:365) and AML (Gomez-Rendón 2005:48), PML does not follow the Quichua voicing rule for the accusative marker *–ta* as stated in section 2.7. In addition, PML, like AML, voices /p/ → [b] and /s/ → [z] in intervocalic positions. PML also devoices other stops in morphemes that are typically voiced in Quichua. The following is a list of common morphemes and inflections that have consistently voiceless

initial consonants in PML but which are typically voiced in colloquial Quichua after nasals and vowels:

Morpheme/ Inflection	Typical PML Pronunciation	Uncommon or Unattested PML Pronunciation
Past	-ɾka_	*-ɾɣa_
Progressive marker	-hu / -ku	*-ɣu
Topic marker	-ka	*-ɣa
Accusitive marker	-ta	*-da
Plural marker	-kuna	*-ɣuna (1:110)
Commitative marker	-ntin	*-ndin
Ablative marker	-manta	*-manda (3:222)
Locative marker	-pi	*-bi
Genitive marker	-pa(k)	*-ba(k) / *-ba(g) / *-pa(g) /*-pa(ɣ) / *-ba(ɣ)
Diminutive marker	-ku /-hu /-ɣu/	*-gu
Conjunction	-piʃ / -paʃ	*-biʃ / *-baʃ
Benefactive marker	-pa(k)	*-ba(k) / *-ba(g) / *-pa(g) /*-ba(ɣ) / *-pa(ɣ)

Figure 9: Common Devoiced Morphemes and Inflections in PML

4.5 Lexical Freezing and Morphological Regularization

Muysken (1997:384) defines the process of 'freezing' as "the combination of Spanish words in a single Media Lengua word", e.g., SP *aún no* 'not yet' as PML *aunu* or SP *de veras* /de beɾas/ 'really?' as PML *deberas*. Both freezing and morphological regularization are less common in PML than SML. The few direct examples of freezing are found in the frozen from *auno* or *ano* 'before', the occasional Spanish plural *–s,* and the occasional Spanish past participle *-ado*:

Freezing:

(60) **auno** [34]kozna-ʃpa-ʒata maki-ta laba-ni
before cook-SSC-TOT hand-ACC wash-1.PRES
'Even before cooking, I wash [my] hands.'

(61) muʧu koza-**s**-kuna-ta-mi abla-na kanʧi
many thing-**PL(sp)**-PL-ACC-VAL speak-INF be-1p.PRES
'We have to talk about a lot of things.'

[34] The verb *koznana* 'cook' is common place in PML whereas SML has *kosina* (Muysken 1997:384)

(62) jo-ka madɾuɣ-**adu** madɾuɣ-**adu**-mi lebanta-ni kada dia
1-TOP dusk-PP **(sp)** dusk-PP **(sp)**-VAL get_up-1.PRES each day
'I wake up very early every day.'

Morphological regularization (the process of joining two or more Spanish words into one PML word) is almost non-existent in PML. At the time of writing, I have discovered only two examples, both of the same word from two different consultants. And interestingly enough, one of only two examples given by Muysken (1997:385); *ɾeloχu* 'watch':

Morphological Regularization:

(63) ese ɾeloχ**u**-ka daɲa-ʃka-mi
DET watch-TOP damage-PP-VAL
'This watch is broken.'

The other example given by Muysken (1997:385) is *sol, solo* 'sun', although only *sol* appears to exist in PML:

(64) fuju-kuna-ka sol-ta-mi tapa-hu-n
cloud-PL-TOP sun-ACC-VAL cover-PROG-3.PRES
'The clouds are covering the sun.'

4.6 Lexical Reduction

Another similarity to SML is found in the reduction of lexemes in PML. The PML quotative marker used for reported speech appears as *dizina* 'say', as in:

(65) ese seɲoɾ-ka aki-ta-mi i-ngi **dizi**-wa-ɾka.
DET sir-TOP here-ACC-VAL go-2.PRES **say**-1DO-3.PAST
'That man told me that you go here.'

(66) el-ka bueno kosas-kuna-ta-mi jo-ta-ka **dizi**-ɾka
3-TOP good thing.PL(sp)-PL-ACC-VAL 1-ACC-TOP **say**-3.PAST
'He said good things about me.'

However, like SML, PML allows for the optional reduction to of *dizina* to *zina* 'say':

(67) doktoɾ-ka oʧo pastiʒa-ta toma-ʧun **zi**-wa-ɾka-mi
doctor-TOP eight pill-ACC take-DS.SUBJ **say**-1DO-3.PAST-VAL
'The doctor told me to take eight pills.'

The same holds true for the Quichua-derived verb *jujana* 'think', which like SML allows for the optional reduction to *jana*[35] in PML, but only in first person singular. All other persons use the relexified verb *pensana* 'think'.

(68) jo-ka eʒa-ka bente aɲo-ta tini-ʃka **ja**-ɾkani
1-TOP 3-TOP twenty year-ACC have-PP **think**-1.PAST
'I thought she was twenty years old.'

4.7 Reduplication

As with SML (Muysken 1997:384), the reduplication of adjectives and adverbs is a very common innovation in PML. At the time of this writing, only one example (which involved a relexified adjective) of reduplication has been found in the IQ dataset, compared with hundreds of examples in PML. Reduplication appears to be used as an intensifier instead of the typical adverbial constructions found in Spanish and Quichua.

(69) PML Reduplication
jo kompɾa-nɣapa-ka **kaɾu** **kaɾu**-ta-mi pedi-ɾka
1 buy-SS.SUBJ-TOP **expensive** **expensive**-ACC-VAL ask-3.PAST
'[The price] he/she/they asked [was] too expensive in order for me to buy.'

(70) Unified Quichua
ɲuka ɾandi-nɣapak-ka aʧaka ʧanijuk-ta-mi miʧaja-ɾka
1 buy-SS.SUBJ-TOP very expensive-ACC.VAL ask-3.PAST
'[The price] he/she/they asked [was] very expensive in order for me to buy.'

(71) Spanish
lo ke pidi-o fu-e demasiado kaɾo paɾa ke jo lo kompɾ-e
that which ask-3.PAST be-3.PAST too expensive so that 1 DO buy-1.PRES
'That which he/she asked was too expensive for me to buy it.'

[35] *jana* has not been attested in the local Quichua dialect

(72) PML Reduplication
ese koles-ka ʧikito-mi **berde berde**-wan-mi
DET cabbage-TOP small-VAL **green green**-COM-VAL
'This cabbage is small and with [a] very green [colour]'.

(73) PML Reduplication
ese hari-ta ke jo ajuda-rkani **bueno bueno**-mi ka-ʃka
DET man-ACC that 1 help-1.PAST **good good**-VAL be-PP
'The man that I helped had been very good.'

4.8 Deixis

As Muysken (1997:391) points out, there is a divergence in the demonstrative and locative deictic pronouns between Spanish and Quichua. SML and PML each have different approaches for dealing with these conflicting systems. Typically Quichua creates locative deictic pronouns by adding the locative morpheme *–pi* to both the distal (*ʧaj* 'that') and proximal (*kaj* 'this') demonstrative roots.

Quichua		
	Demonstrative	Locative
Proximal	*kaj* 'this'	*kajpi* 'here'
Distal	*ʧaj* 'that'	*ʧajpi* 'there'

Table 22: Quichua Deictic Pronouns

SML uses *isti* 'this', from the Spanish *este,* for both demonstrative and locative purposes, along with the locative-only form, *aki* 'here'. The form *isti* does not appear with the locative marker, though *aki* frequently does. A similar pattern in SML occurs for distal deictic pronouns: SML *isi*, from the Spanish *ese* which, again, can be used for both demonstrative and locative purposes, along with the locative-only forms *aʒi, aʒa* and *aí*.

Salcedo Media Lengua		
	Demonstrative	Locative
Proximal	*isti* 'this'	*aki, akipi* 'here'
Distal	*isi* 'that'	*aʒa, aʒi, a.i, aʒapi, aʒipi, a.ipi* 'there'

Table 23: SML Deictic Pronouns

The dietic pronouns of PML have undergone further simplification compared to those in SML. Both the distal and proximal demonstratives appear as *ese* 'this, that' derived from the Spanish distal form[36] *ese* 'that'. Both the distal and proximal locative deictic forms in PML take the locative marker *–pi*. The proximal locative appears as *akipi* or *akapi* and the distal form appears as either *aʒapi* or *aʒipi*.

Pijal Media Lengua		
	Demonstrative	Locative
Proximal	*ese* 'this, that'	*akipi* 'here'
Distal		*aʒapi, aʒipi, a.ipi* 'there'

Table 24: PML Deictic Pronouns

Plural demonstratives in all three languages are formed by adding the plural morpheme *–kuna* to the root of the deictic pronoun.

Quichua Plural Demonstratives	
Proximal	kajkuna
Distal	ʧajkuna
Salcedo Media Lengua Plural Demonstratives	
Proximal	istikuna
Distal	isikuna
Pijal Media Lengua Plural Demonstratives	
Proximal	esekuna 'this, that'
Distal	

Table 25: Plural Demonstrative Pronouns in Q, SML and PML

4.8.1 *Ese* as an Article

The usage of *ese* in PML suggests that it might be an emerging article similar to Spanish *el, la, los* and *las*. PML speakers have a high tendency to replace articles from elicited Spanish sentences with *ese* in the PML translations and in spontaneous speech,

[36] Nine elicited tokens of 380 contained [esti] and several more appear in spontaneous speech, however, they are either ambiguous with regards to the proximal vs. distal distinction or they appear in code-switching sentences.

where *kay* or *chay* would not otherwise appear in Quichua. However, the placement of *ese* tends to be sentence-initial:

(74) Spanish
el boske fue pɾotex-ido
DET.M forest be-3.PAST protect-PP
'The forest was protected.'

(75) PML
ese boske-ka kuidaʃkami
DET forest-TOP care-PP-VAL
'The forest was protected.'

(76) Quichua
satʃa-kuna-ka wakaitʃi-ʃka.
forest-PL-TOP save-PP
'The forest was protected.'

(77) Spanish
la makina se paɾ-o
DET.F machine REFL stop-3.PAST
'The machine stopped.'

(78) PML
ese makina-ka paɾa-ɾi-ʃka-mi
DET machine-TOP stop-REFL-PP-VAL
'The machine stopped.'

(79) Quichua
makina ʃaja-ɾi-ɾka.
machine tire-REFL-3.PAST
'The machine stopped.'

4.9 Expressing Desire

Unlike SML, PML does not preserve the Quichua structure V*sha* + *nina* to express desire[37]. Examples expressing desire use the relexified verb *kiɾina* from Spanish *querer* /keɾeɾ/ 'want', the phonological shell of which replaces that of the Quichua verb *munana* 'want'. *Kiɾina* can also be used to express 'want, love, need, like and enjoy'.

Kiɾina:

(80) jo-ka eskuela-pi no ɾepiti-na-ta kiɾi-ni-ʧu
1-TOP school-LOC NEG repeat-INF-ACC want-1.PRES-NEG
'I don't want to repeat school.'

(81) jo-ka eskɾibi-ngapa lapis-ta-mi muʃuk-wa-ta kiɾi-ni
1-TOP write-SS-SUBJ pencil-ACC-VAL new-DIM-ACC want-1.PRES
'I need a new pencil in order to write.'

4.10 Reflexives

Muysken (1997:398) says that SML forms reflexives by placing the "affix combination *-lla-di* 'just, precisely' (lit. "delimitative-emphatic")" on the noun phrase. Muysken gives examples of this reflexive form in both Cotopaxi Quichua and SML. However, this formation is not found[38] in Imbabura Quichua. Both IQ and PML opt for the reflexive verbal suffix *-ɾi* which attaches to the verb stem before inflection.

(82) Cotopaxi Quichua (Muysken 1997:398)
ɲuka-ʒa-di ɾiku-ni
1-DEL-EMP see-1.PRES
'I see myself, [lit. I same see].'

(83) Imbabura Quichua
ɲuka-ka espexo-pi-mi ɾiku-ɾi-ni
1-TOP mirror-LOC-VAL see-REFL-1.PRES
'I see myself in the mirror.'

---

[37] One out of 74 tokens have the V*ʃa* + *nina* construct: *eʒaka komidata koɾʦ**ʃa dizin**mi no kuʧiʒuwan* 'She wants to cut the food, but not with a knife.'

[38] Not a single instance of *–lladi* was encountered in my research.

(84) Salcedo Media Lengua
jo-ʒa-di bi-χu-ni ami-ʒa-di
1-DEL-EMP see-PROG-1.PRES 1DO-DEL-EMP
'I am seeing myself.'

(85) Pijal Media Lengua
jo-ka espexo-pi-mi bi-ɾi-ni
1-TOP mirror-LOC-VAL see-REFL-1.PRES
'I see myself in the mirror.'

(86) Pijal Media Lengua
el-ka ɣoʒo-ta-mi kita-ɾi-n
3-TOP hat-ACC-VAL remove-REFL-3.PRES
'He himself takes off the hat (*el se quita la gorra)*.'

4.11 Comparatives and Superlatives

PML comparatives and superlatives are much more hispanized than those in SML. While SML forms comparatives by adding an inflected or adverbial form of the verb *ganan* from the Spanish *ganar* 'win' (Muysken 1997:397), PML borrows directly from the Spanish formation for both comparatives and superlatives, and can include the optional ablative marker *–manta* placed on the object:

Spanish Comparatives:

(87) mi auto es mas gɾande ke tu auto
1.POSS car be-3.PRES more big than 2.POSS car
'My car is bigger than your car.'

(88) ese aɾbol es mas gɾande ke el maiz
DET tree be-3.PRES more big than DET.M corn
'That tree is bigger than the corn.'

PML Comparatives:

(89) ju-pa auto-ka mas gɾande bos-pa kaɾo-mi
1-GEN car-TOP more big 2.POSS car-VAL
'My car is bigger than your car.'

(90) ese jura-ka sara-manta mas grandi-mi
DET Tree-TOP Corn-ABL more big-VAL
'That tree is bigger than the corn.'

Spanish Superlatives:

(91) el es el mas grande de toda la familia
3 be-3.PRES DET.M more big PREP all DET.F family
'He is the biggest of all the family.'

(92) este es el mas largo kamino
DET.M be-3.PRES DET more long trail
'This is the longest trail.'

(93) ese arbol alto es el mas grande
DET.M tree tall be-3.PRES DET.M more big
'That tall tree is the biggest.'

PML Superatives:

(94) el-ka mas grande-mi toda la familia-manta.
3-TOP more big-VAL (all DET.F family)[39]-ABL
'He is the biggest of all the family.'

(95) este kamino-ka el mas largo-mi
DET trail-TOP DET more long-VAL
'This is the longest trail.'

(96) ese arbol-ka alto alto-mi mas grandi-mi
DET tree-TOP tall tall-VAL more big-VAL
'That very tall tree is the biggest.'

4.12 Pronouns

Pronouns in PML are very similar to those in SML, with the addition of the female third person singular *eʒa* 'she' derived from the Spanish word *ella* [eja] of the same meaning.

[39] Code-switching

Person	Quichua	SML	PML	Spanish	Gloss
1	ɲuka	jo/ami+case	jo	ʝo	'I'
2	kan	bos	bos / os[40]	tu /bos	'thou'
2 Formal	kikin	--	uted/usted[41]	usted	'thou'
3M		--	el	el	'he'
3M/F	paj	el	--	--	--
3F	--	--	eʒa	eʒa / eja	'she'
1p	ɲukanʧi	nustru	nosotɾos/ nuestɾo/ ɲukanʧi	nosotɾos	'we'
2p	kankuna	boskuna	boskuna	ustedes	'you'
2p Formal	kikinkuna			ustedes	'you'
3pM	--	--	elkuna	eʒos/ ejos	'they (M)'
3pM/F	pajkuna	elkuna	--	--	'they'
3pF	--	--	eʒakuna	eʒas/ ejas	'they (F)'

Table 26: Pronouns

4.13 Possessives

Another noteworthy similarity between SML and PML is the incorporation of the exact same frozen strong form possessors in first person singular & plural and the second person singular. The SML forms as documented by Muysken (1997:384) are *miu* (1.POSS), *nustru* (1p.POSS), and *tuyu* (2.POSS), whereas PML uses *mio* 'my' (1.POSS), *tuyu* /tuju/ 'your' (2.POSS), *nuestru* /nuestɾu/ 'our' (1p.POSS), along with the Quichua possessor *ñukanchi* /ɲukanʧi/ 'our'.

Pijal Media Lengua:

(97) mio wawa-ka kinse aɲo-ta-mi tini-n
1.POSS child-TOP fifteen year-ACC-VAL have-3.PRES
'My child is fifteen years old.'

(98) tuju ixa-ka kuanto año-ta-ta tini-n
2.POSS daughter-TOP how many year-ACC-Q(wh) have-3.PRES
'How old is your daughter?'

In addition to the strong frozen form, singular possessors in PML can also be formed with the genitive suffix *–pa*:

[40] The use of the informal second person *os* is rare. It is probably a shortened form of *bos*. Although less likely, it could be derived from the reflexive form of the second person plural/formal *os*.
[41] The use of the formal second person *usted* is rare. Only three tokens have been discovered during my research.

Noun+*pa(k)*

	PML	IQ	Gloss
1	jopa	ɲukapa	'my'
2	bospa	kanpa	'your'
3	elpa	pajpa	'his/ hers'
3	peropa	alkupa	'dog's'

Table 27: Possessives using the genitive morpheme *-pa*

(99) bos-**pa** warmi-ku onde-pi-ta ja i-ngapa
2-GEN wife-DIM where-LOC-Q(wh) already go-SS-SUBJ
'Where's your wife so we can get out of here?'

In both Quichua and PML possession is structured as POSSESSOR + POSSESSUM. This presents yet another option for possession in both IQ and PML. Since this is one of the few strict constructions in Quichua, the possessor does not need to take the genitive morpheme *-pa*.

Imbabura Quichua:
(100) kan-kuna uʃuʃi-ka aʒi-mi kilka-ngapa
2-PL daughter-TOP good-VAL write-SS.SUBJ
'Your daughter is good at writing.'

Pijal Media Lengua:
(101) bos-kuna ixa mas bueno eskɾibi-ngapa
2-PL daughter more good write-SS.SUBJ
'Your daughter is very good at writing.'

4.14 Question Words

Question words in PML are identical to those found in SML. Both systems are modeled on Spanish semantics rather than Quichua (Muysken 1997:394).

Quichua	Spanish	PML	SML	Gloss
pi	kien	kin	kin	‘who’
ima	ke	ke	ki/inki	‘what’
majhan	kual	kual	kual	‘which’
maʃna	kuanto	kuanto	kuantu	‘how much’
imawras	kuando	kuando	kuandu	‘when’
	a ke ora	ke oras	ki uras	‘at what time’
imamanta	por ke	porki	porki	‘why’
imashna	komo	komo	komo	‘how’
may	donde	onde	onde	‘where’

Table 28: Question Words

4.15 Temporal Expressions

Code-switching in PML is more prevalent than in IQ. In addition to PML’s position as an intermediate language between both Quichua and Spanish, this higher rate of code-switching occurs as a result of PML being spoken by bilingual speakers whom typically use more Spanish in their daily lives. Code-switching is used to convey ideas which are more typical of the Spanish speaking population. Temporal expressions are one of the more common forms of code-switching. Almost every temporal expression in PML retains functional Spanish features such as gender and number. Code-switching in PML is typically found in strings of two to three lexemes lifted directly from Spanish. The following chart contains common temporal expressions from PML:

PML	IQ	Spanish	Gloss
las dos i mediami.	iski paʧa kimsa ʧunka tatkikunawanmi	son las dos i media	‘it’s two thirty’
kada dia	kada punʒa	kada día	‘each day’
kada ɾatomi	kada tuiʒami	kada rato	‘each moment’
todos los diasmi	tukui punʒa	todos los días	‘every day’
oi de noʧeka	kunan tutaka	oi de noʧe	‘tonight’
de noʧe	tutapi	de noʧe	‘at night’
aoɾa de maɲanaka	kunan tutamanda	aora de maɲana	‘this morning’
oi diaka	kunan punʒa	oi día	‘today’
kada de maɲana	kada tutamanda	kada maɲana	‘each morning’
misma oɾa	punʒaʒada	la misma oɾa	‘the same time’
antes de	naɾa	antes de	‘before’
toda la noʧe	tukui tuta	toda la noʧe	‘all night’
todas las maɲanas	kada tutamanda	todas las maɲanas	‘every morning’
ase tɾes aɲo	kimsa wata puntapimi	ase tɾes aɲos	‘three years ago’

Table 29: Code-Switching Temporal Expressions

The other method PML speakers used was the complete exclusion of the temporal expression from the elicited sentence:

Elicited Sentence:
(102) *mis amigos esperaron una media ora.* 'My friends waited for a half an hour.'

PML interpretation:
(103) ese grupo wambra wawa-kuna y kuytsa-kuna espera-wa-rka-mi.
DET group young child-PL CONJ miss-PL wait-1DO-3.PAST-VAL
'This group of yongsters waited for me.'

Elicited Sentence:
(104) *a beses me pongo mis guantes kuando trabaχo en la tiera.*
'Some times I put on gloves when I work in the dirt.'

PML interpretation:
(105) ju-ka trabaχa-ngapak guantes-kuna-ta pone-ni-mi
1-POSS work-SS.SUBJ gloves-PL-ACC put-1.PRES-VAL
'I wear gloves in order to work in the dirt.'

Elicited Sentence:
(106) *sembramos mutʃo maís el aɲo pasado.* 'We planted a lot of corn last year.'

(107) PML interpretation:
nuestro-ka arto mais-ta-mi sembra-rkantʃi
1p-TOP much corn-ACC-VAL plant-1p.PAST
'We planted a lot of corn.'

5 Pijal Media Lengua Phonemic Inventory

Based on data from minimal pairs and near minimal pairs analyzed in Praat 5.2.9 (Boersma and Weenink), PML contains the following phonemic inventory. Common allophones are presented in brackets ([]):

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Palatal	Velar	Uvular	Glottal
Plosive	p b			t d			k [g]		
Nasal	m			n		ɲ			
Trill									
Tap				ɾ					
Fricative	[ß]	f		s [z]	ʃ ʒ		x ɣ	[χ]	h
Approximant						j			
Lateral Approximant				l					

PML also includes the voiceless palato-alveolar affricate /ʧ/ and the voiceless alveolar affricate [ʦ].

Table 30: PML Phonemic Inventory

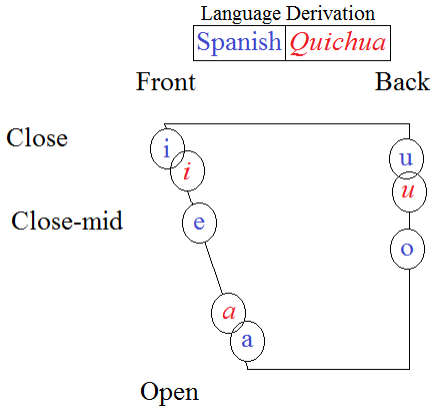


Figure 10: PML Vowel Inventory

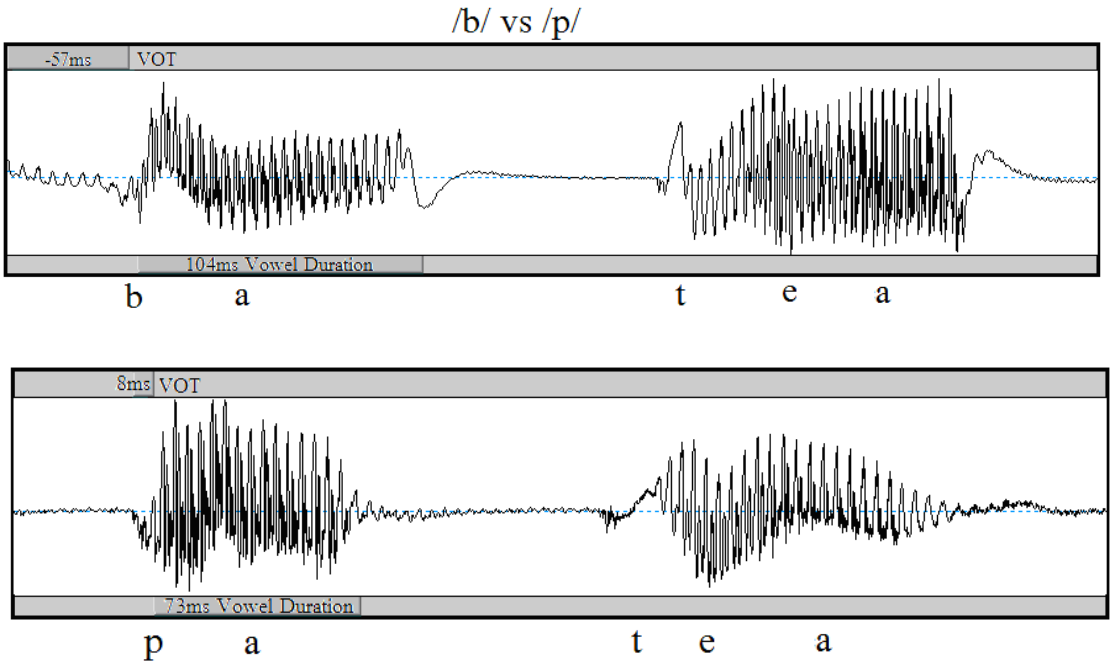
It is traditionally accepted that Quichua contains no phonemic voiced obstruents. It is also documented that Spanish-derived voiced obstruents in Quichua do not occur phonemically in native items either (Heggarty 2005, Gómez-Rendón 2007:482). PML presents a different story through its nearly complete relexification of Spanish vocabulary. This has caused the nativization of Spanish phonemes which now have a role in distinguishing minimal pairs.

5.1 Consonants

Based on data gathered from both word initial and word medial voiced plosives, negative voice onset time (VOT) appears the most prominent quality for identifying the [+voiced] feature. The following wave forms present VOTs for plosives at the top of image and post vowel duration on the bottom. All pairs are minimal except *puerta* /puerʃta/ 'door' and *fuerte* /fuerʃte/ 'strong', since no minimal pairs for /p/ and /f/ were present in my dataset[42].

5.1.1 Labials

5.1.1.1 /b/ vs. /p/



Minimal Pair- Pijal Media Lengua: *batea* /batea/ 'recipient' vs. *patea* /patea/ 'kick'

Figure 11: /b/ vs. /p/

Figure 11 shows the voiced bilabial plosive /b/ (top) with a negative VOT of -57ms whereas its voiceless counterpart /p/ (bottom) has a positive VOT of 8ms.

[42] . This is not to say they do not exist, potential examples include *fuente* 'source, fountain' and *puente* 'bridge'; and *paja* /paxa/ 'straw' and *faja* /faxa/ 'girdle'.

5.1.1.2 /f/ vs. /p/

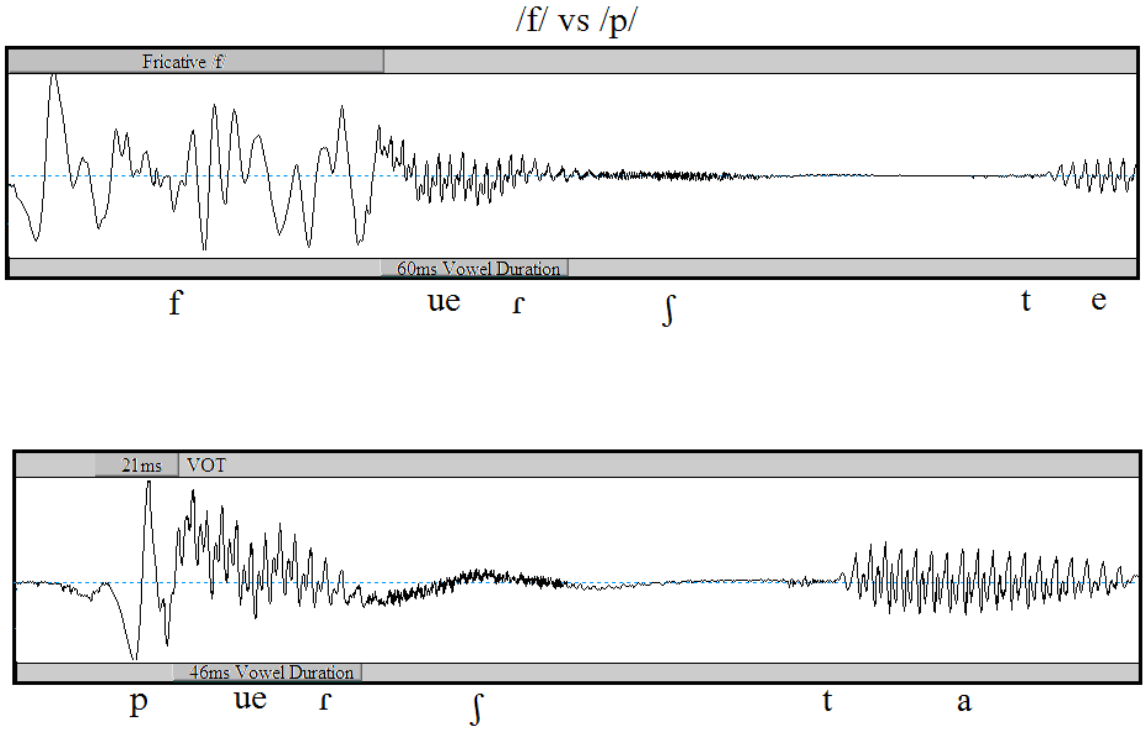


Figure 12 /f/ vs. /p/

Figure 12 shows two near-minimal pairs contrasted by the word initial and word final phoneme. The pair in question are word-initial. The top image shows an irregular wave pattern commonly associated with voiceless fricatives (/f/) whereas the second image (/p/) presents a release followed by a 21ms VOT (typical of a plosive).

5.1.2 Dentals

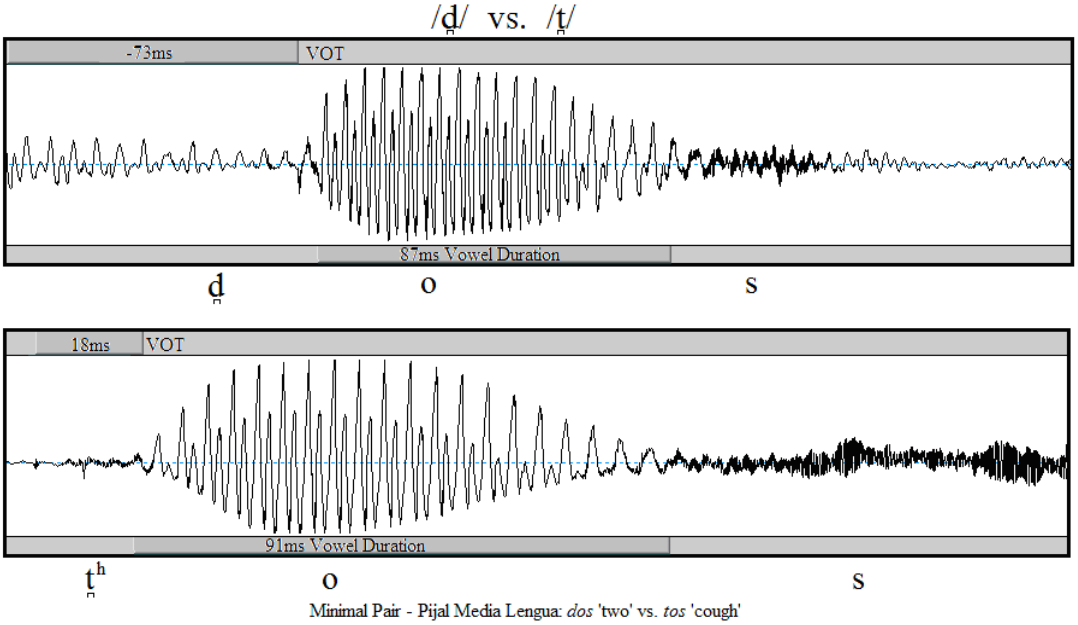
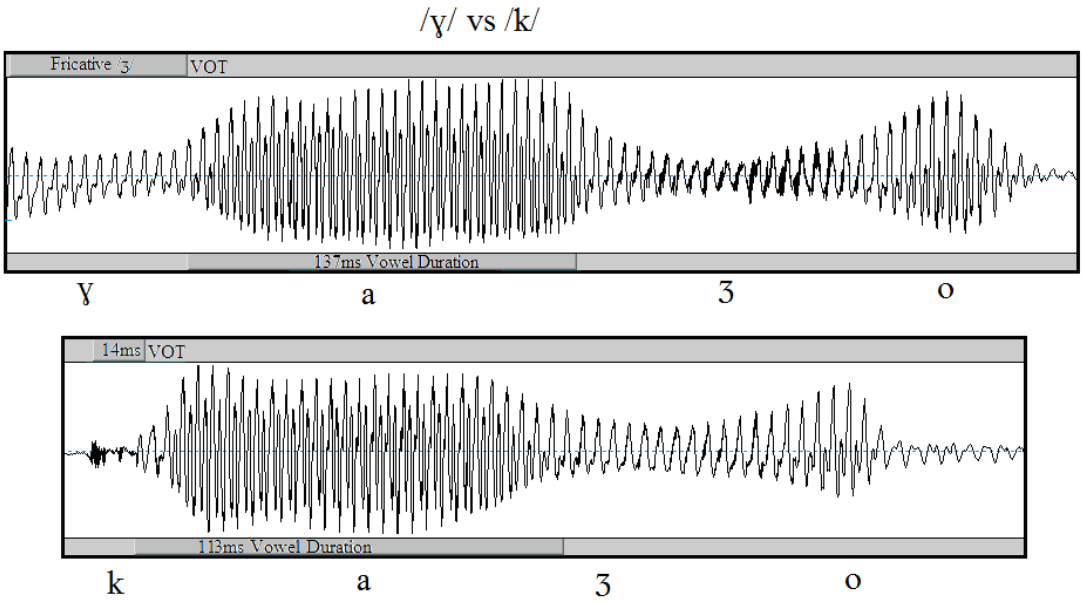


Figure13: /d/ vs. /t/

Figure 14 shows the voiced dental plosive with a negative VOT of -73 ms. Its voiceless counterpart /t̪/ has a positive VOT of 18 ms. Negative VOTs are a common feature of voiced plosives in Spanish (Ashby 2005:93) and it seems speakers of PML have adopted this distinguishing quality as well.

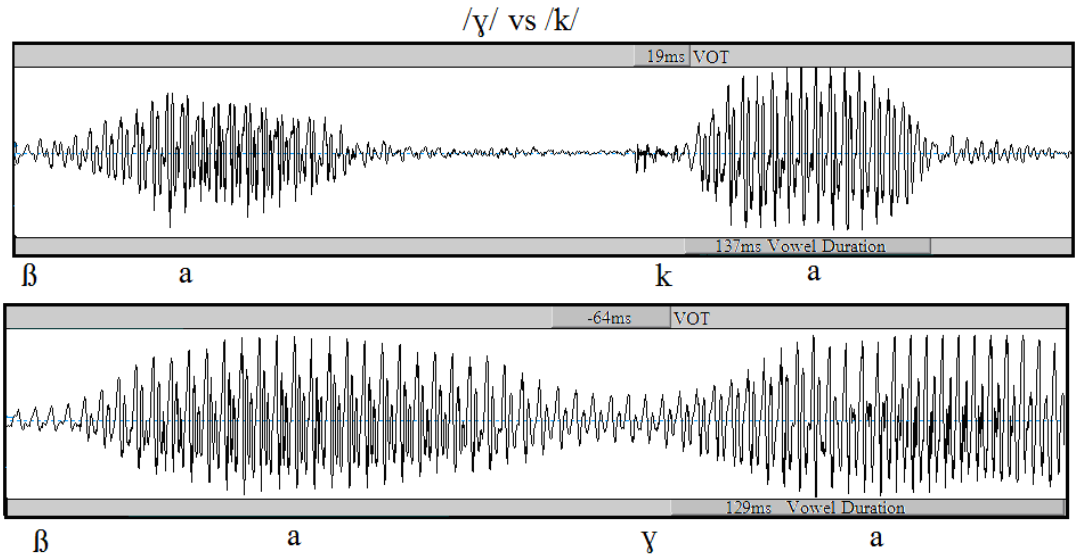
5.1.3 Velars

5.1.3.1 /ɣ/ vs. /k/



Minimal Pair - Pijal Media Lengua: *gallo* /'gaʒo/ 'roster' vs. *carro* /'kaʒo/ 'car/bus'

Figure 14: Word-Inital /ɣ/ vs. /k/



Minimal Pair- Pijal Media Lengua *vaca* /ßaka/ 'cow' vs. *vaga* /ßaɣa/ 'lazy'

Figure 15: Intervocalic /ɣ/ vs. /k/

Speakers of PML have the voiced velar plosive /g/ from Spanish-derived lexemes with the voiced velar fricative /ɣ/ as illustrated by the lack of a release burst in figure 15 (top) and 16 (bottom). Voiced allophonic variations of the velar plosive /k/ are rare in

PML morphemes and in most Spanish dialects /g/ → [ɣ]/V_V. Instead the types of fricative patterns as seen in figure 17 (top) and figure 16 (bottom) are present.

PML has also merged the Spanish trill /r/ and Spanish palatal fricative /j/ into the voiced postalveolar /ʒ/.

5.1.3.2 Spanish /x/ vs. PML /x/

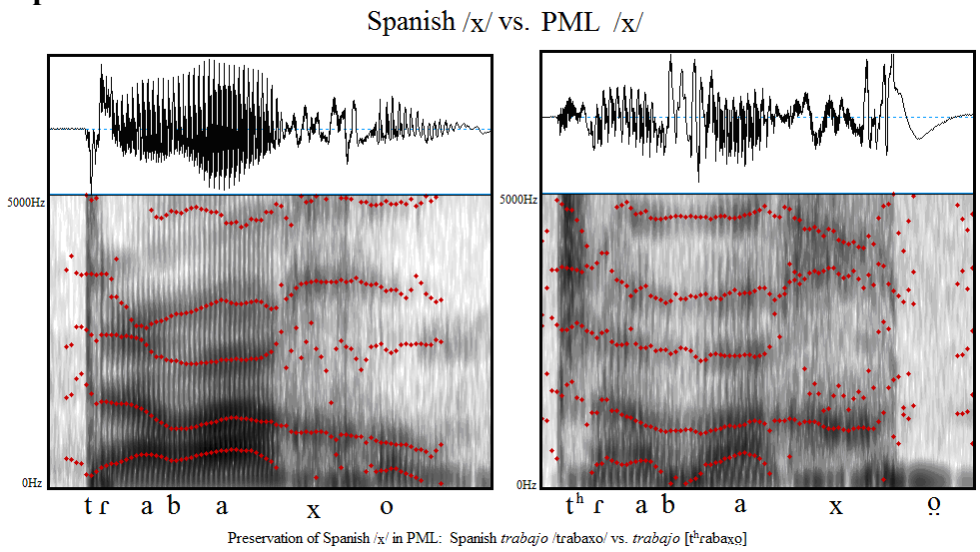


Figure 16: Spanish /x/ vs. PML /x/

The voiceless velar fricative /x/ is typically found in both Quichua and Spanish borrowings, although; allophonic variations may include its uvular or glottal counterparts, [χ] and [h]. The most apparent distinction between the /x/ and /h/ is the greater amplitude and longer cycles of noise produced by the velar fricative.

5.1.4 [z] as an Allophone of /s/

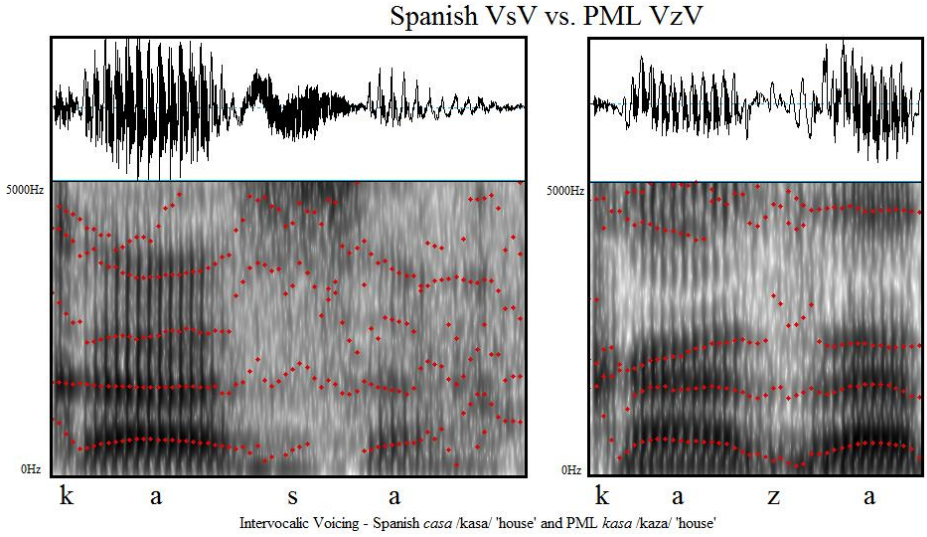


Figure 17: Intervocalic /s/ as [z]

The voiced alveolar fricative [z] appears as an allophonic variation of /s/ when intervocalic (a common feature of Quichua).

5.1.5 Aspiration

Aspiration appears in a number of word-initial plosives as an allophonic variation (see figure 16 /t^h/ compared to figure 13 /t/). Kohlberger (2010: 51) shows aspiration as an allophonic feature of Cotopaxi Quichua, although his example is problematic for the Imbabura dialect, since *piña* [p^hiɲa] 'angry' is often produced as [fiɲa] through a supposed substratum influence from the extinct Cara language[43].

[43] Cara survived in the area of present day Imbabura until at least the 18th century CE.

5.1.6 Archaic Spanish /x/ Preservation

According to Muysken (1997:372) a number of lexemes in SML maintain the archaic word-initial /x/ from an earlier period of colonial Spanish (CS). These words form part of a diachronic preservation from word-initial [h][44] lexemes in Vulgar Latin which were eventually lost in Ecuadorian Highland Spanish (EHS) during an unknown time period. Both IQ and PML conserve a variety of word-initial /x/, but to a lesser degree than SML.

IQ	PML	SML	CS	EHS	Gloss
Xabas	Øabas/ xabas	xabas	*xabas	abas	'fava bean'
Xondo	xondo	xondo	*xondo	ondo	'deep'
--	xaʧa	xaʧa	*xaʧa	aʧa	'axe'
--	Øazinda	xazienda	*xasienda	asienda	'farm'
--	Øamaka	xamaka	*xamaka	amaka	'hammock'
--	jeɾba	*xiɾba	*xierba	ieɾba	'herb, grass'
--	xilana	--	*xilar	ilaɾ	'to spin'

Table 31: Archaic Preservations of CS */x/

5.2 Vowels

Pijal Media Lengua has preserved mid vowels from Spanish. The general distinction is as illustrated in figure 20, where the mid vowels have a slightly lower F2 than their high vowel counterparts. The mid vowel /e/ in figure 20, for instance has an overall lower F2 whereas /o/ in figure 21 has an overall higher F2 when compared with their high vowel counterparts in minimal-pair comparisons:

[44] Words derived for Latin [f], which in Old Peninsular Spanish changed to [h], were lost before arriving to the Americas: Latin *faseˇre* → Vulgar Latin *fa.sẹ.re* → Old Peninsular Spanish *fa.zeɾ* / *ha.zeɾ* (El Mio Cid (1972:62-815) "faré" *haré* 'will do'; El Mio Cid (1972:32-290) *hacen* "3pl do")→ EHS: *aseɾ*.

Vowel Minimal Pairs:

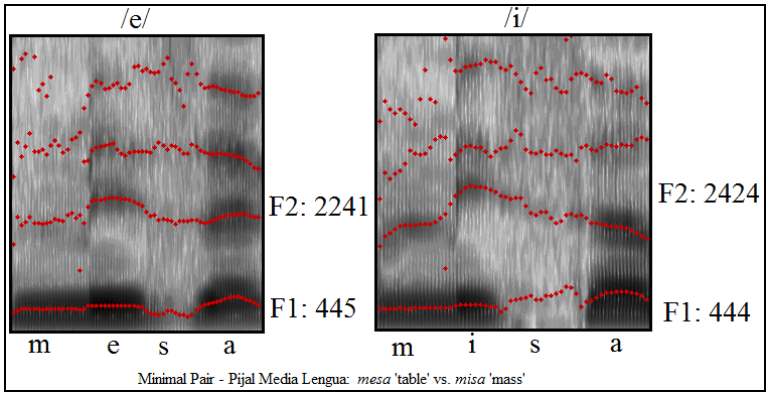


Figure 18: Minimal Pairs /e/ vs. /i/

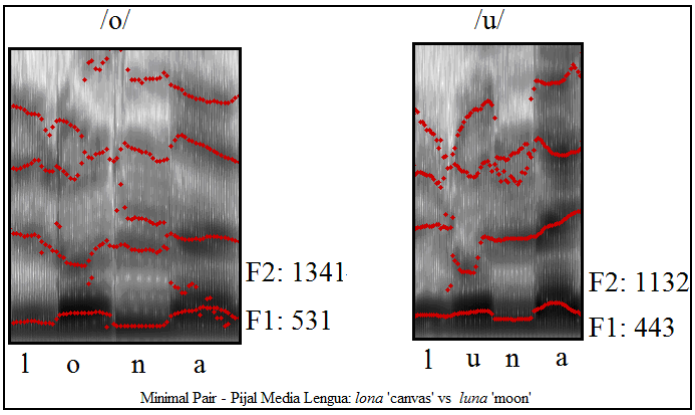


Figure 19: Minimal Pairs /o/ vs. /u/

6 Comparative Vowel Space Analyses of PML and IQ

6.1 Background

What is the phonetic nature of vowel production in contact situations? Do vowels become a single system wherein L2 borrowings have undergone complete phonetic assimilation (complete merger)? Do they become a dual system where separate vowels are used depending on the origin of the lexeme or morpheme in question? Do they become an intermediate variety with overlapping formant frequencies (varying degrees of merger)? The idea of phonetic duality has been a topic of linguistic debate, although acoustic evidence from a mixed language has not been analyzed using statistical methods to my knowledge. The majority of phonetic observations with contact varieties have been impressionistic, with the exception of Michif. According to Rosen (2007:147) Michif has variation with regards to its high back vowel(s). Plans Cree only has one high-back vowel /o/ which typically has a higher F1 formant frequency than French /u/. When the high-back vowel is derived from a French lexeme it may be produced as either [u] or [o], however, when derived from the Plans Cree's "lower-high" back vowel, it only surfaces as [o].

Little phonetic data with regards to the vowel system(s) of mixed languages such as of Ma'a/Mbugu (Mous 2003), Cappadocian Greek, Gurindji Kriol (McConvell and Meakins 2005) has been published. Light Warlpiri, a Warlipiri-Kriol-English mixed language found in the Northern Territory of Australia is claimed to draw its phonology from all three languages. O'Shannessy (2005) states "the LW sound system is a continuum similar to that of Kriol, which can be described as a continuum of sounds with an Aboriginal type sound sub-system at one end and an English type sound sub-system at

the other (Sandefur 1979)". Unfortunately vowels are not described at length. Finally, Goméz-Rendón (2005:11) states that AML passes through a three step process of assimilation where words either (1) maintain Spanish phonotactics [kabesa] 'head', (2) partially assimilate [kabisa] 'head' or (3) undergo complete assimilation [kabiza] 'head'. He also states that high frequency words tend to undergo complete assimilation whereas low frequency words have little, if any assimilation.

6.2 Method

6.2.1 Materials

Due to the nature of Media Lengua, it was impossible to elicit words in a set frame or carrier phrase. Participants would just repeat the elicited word instead of interpreting the PML variety or after several elicitations would begin to repeat *'same/it's the same'*. Therefore, a list containing 100 Spanish sentences was developed to avoid mimicry and participants were asked to give their best oral interpretation of the sentence in PML. Sentences and word selection were designed to cover all places of articulation in both pre-vowel and post-vowel positions in PML. These included both voiced and voiceless phonemes and allophones in the bilabial (/p/, /b/ or [β], /m/), labiodental (/f/), dental/alveolar/postalveolar (/ʧ/, /t/, /d/, /n/, /r/, /ɾ/, /s/, [z], /ʃ/, /ʒ/, /l/), palatal (/ɲ/, /j/), velar (/k/, /x/, /ɣ/) and glottal /h/ positions. This sentence list was also used during Imbabura Quichua elicitions in order to maintain the same elicitation conditions.

Sentences were recorded on a TASCAM DR-1 portable digital recorder using TASCAM's compatible TM-ST1 MS stereo microphone set to 90˚ stereo width. Elicitations were recorded in 16-bit Waveform Audio File Format (WAV) with a sample rate of 44.4kHz. Recordings were then split and saved into five minute WAV file

segments using Praat 5.2.9 (Boersma and Weenink) on a PC and encrypted using the free open source True Crypt software, in compliance with the University of Manitoba's ethics protocol #J2010:042 .

6.2.2 Participants

Ten Quichua /Media Lengua /Spanish trilinguals, six females and four males, and ten Quichua /Spanish bilinguals, six females and four males participated in this study. Of the Quichua-Media Lengua-Spanish group, all participants learned Quichua and Media Lengua simultaneously from birth and began to acquire Spanish upon entering primary school, typically at 6-7 years of age. Of the Quichua speakers, four females had a rudimentary level of Spanish, one man was a simultaneous bilingual and one man acquired Spanish at the age of 18, while the rest acquired Spanish upon entering primary school, typically at 6-7 years of age. All Media Lengua participants were from the community of Pijal Bajo, while all Quichua participants were from the nearby communities of Chirihuasi and Cashaloma. Participants from both groups reported normal hearing and lived their entire lives in their respective communities.

6.2.3 Procedure

A native Spanish speaker and I gave all instructions and verbally elicited the 100-sentence list in Spanish for the Media Lengua participants. The native Spanish speaker elicited the 100 sentence list in Spanish for the Quichua participants and a native Quichua speaker from Chirihuasi interpreted if confusion arose. Participants were first asked their name, age, place of birth, age of Spanish acquisition, places of residency throughout their life, the native language of each parent and language typically spoken at home and in the

community. The participants were then asked to give their best oral interpretation of each sentence on the 100-sentence list and wait at least five seconds before producing the utterance. We encouraged participants to consult with others if any doubts arose. We also asked participants to speak at a normal conversational speed and to repeat if needed. Consultations with other participants and the five second waiting period made it more likely that speakers were accessing their long-term memory and reducing mimicry (Guion 2003: 107). This was important since several of the participants had not spoken Media Lengua in over a decade. These participants were also asked to practice Media Lengua for a few days before participating in the study.

Eleven hours, 30 minutes of Pijal Media Lengua was recorded for this and future studies with an estimated total of 4750 sentences. Five hours and 16 minutes of Imbabura Quichua was recorded for this and future studies with an estimated total of 1750 sentences. Two thousand five hundred and fifteen vowel tokens were taken from PML while 2191 vowel tokens were taken from Imbabura Quichua (IQ). Nine hundred and twenty-six tokens were used from Quichua-derived lexemes and morphemes in PML, while 1589 vowels were Spanish-derived lexemes in PML; for IQ 990 tokens were used from native Quichua lexemes and morphemes, while 1201 tokens were used from Spanish-derived lexemes in IQ. Spanish-derived vowels were organized based on their original Spanish pronunciation, i.e., the underlined vowel in *ku̲mina* 'eat', would be considered /o/ and not /u/, since its pre-relexifed production was that of /o/ in *comer* /komeɾ/ 'eat'.

I measured vowels using the default settings for the formant command from Praat 5.2.9 (Boersma and Weenink). On rare occasions (2.7% of all tokens) background noise

would result in a false F2 reading. In order to verify the false reading, I used a graphic Linear Predictive Coding (LPC) representation from Akustyk 1.8 (Plichta) and compared it with a Fast Fourier Transformation (FFT) graphic representation. If the LPC matched the questionable formant frequency and the F3 measurement fell within the average F2 frequency for the sound in question, I used Praat's F3 measurement, otherwise the token was excluded. The following images show common formant variations and the typical place of measurement in both PML and IQ:

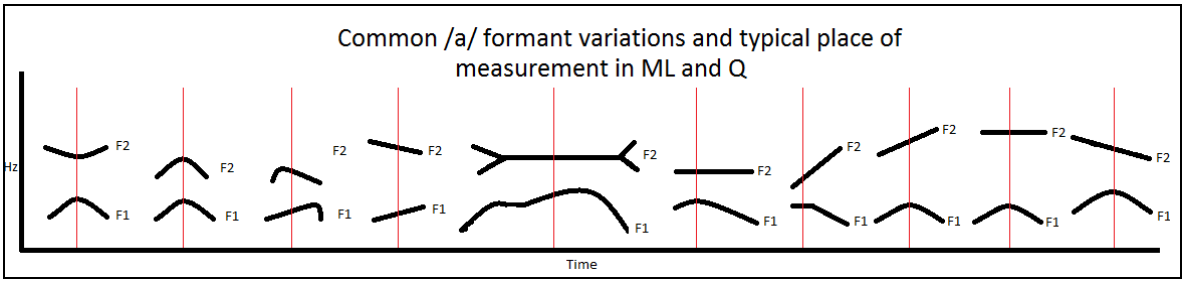


Figure 20: /a/ Formant Variations

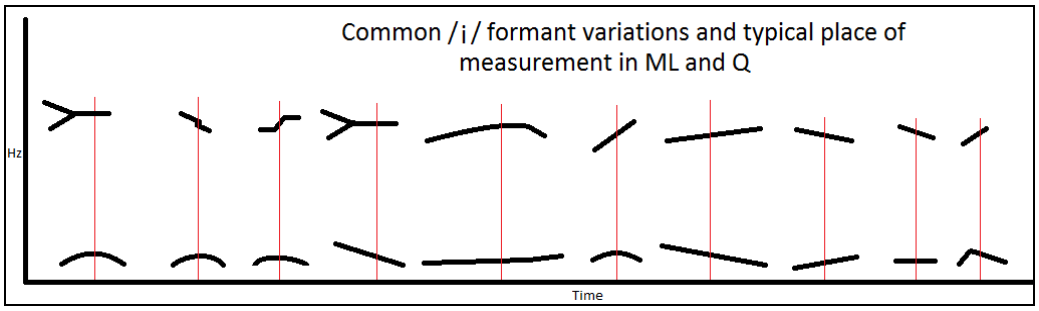


Figure 21: /i/ Formant Variations

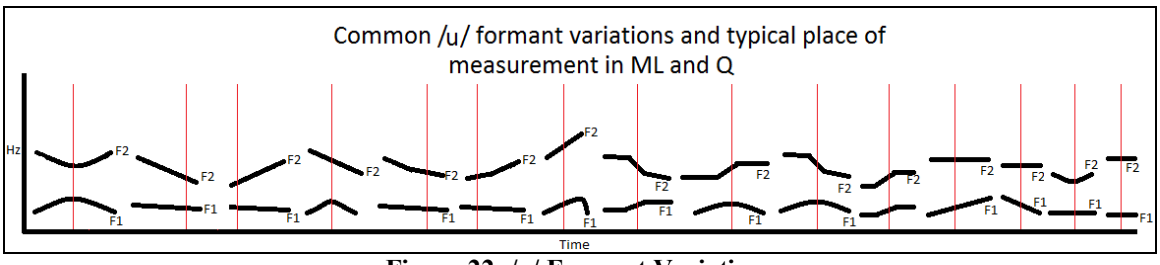


Figure 22: /u/ Formant Variations

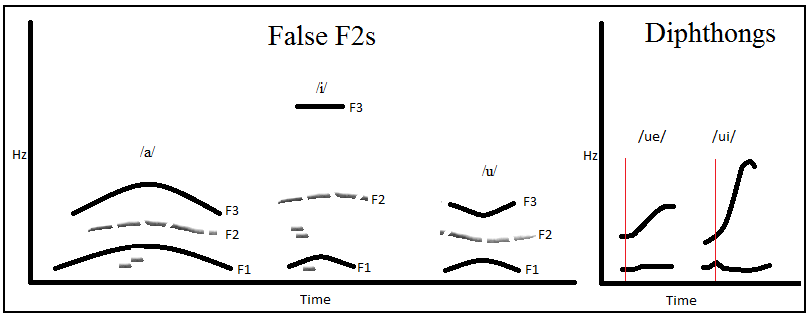


Figure 23: False F2s and Diphthongs

6.3 Results

The results of this study are presented in three sections. The first section tests the hypothesis that PML's Spanish-derived vowels /i/, /u/ and /a/ differ significantly from their PML Quichua-derived counterparts. I analyzed vowel formants from both Quichua-derived and Spanish-derived tokens in PML to determine whether or not speakers of PML are manipulating separate vowel systems based on different formant frequencies. Similar tests are then repeated using data from IQ.

For each vowel, I built a separate mixed effects model to test F1 and F2 frequencies between Quichua-derived /i/, /u/ and /a/ and their Spanish-derived counterparts. The same model building strategy was then repeated for IQ vowels from native Quichua and Spanish-derived words.

The second section tests the hypothesis that ML Spanish-derived vowels /i/ and /u/ differ significantly from ML Spanish-derived /e/ and /o/ respectively. Vowel formant comparisons from the same language of origin provide evidence for or against the existence of /e/ and /o/ in PML. The same hypothesis is then tested using IQ data. I used the same model building strategy as found in the first section to build mixed effects models for the Spanish high- and mid vowel comparisons.

The third section tests the hypothesis that ML Quichua-derived vowels /i/ and /u/ differ significantly from ML Spanish-derived /e/ and /o/ respectively. I then test the same hypothesis using native Quichua vowels /i/ and /u/ against Spanish derived /e/ and /o/ respectively. I used the same model building strategy as found in the first section to build mixed effects models for the Quichua high vowel and Spanish mid vowel comparisons.

Mixed effects models were created in R 2.12.2 with the lmer function of the lme4 package included in the LanguageR package (Baayen 2008). P-values and 95% confidence intervals (CI_{95}) were estimated by Monte-Carlo Markov chain (P_{MCMC}) sampling using the pvals.fnc of *languageR* (Baayen 2008). All the models included 'speaker' and (fully inflected) 'word' as random effects.

I considered the following as possible predictors when building all mixed effects models: position of the syllable relative to the end of the word, features of the pre-vowel environment (including: nasal, stop, fricative, tap, approximant, labial, alveolar, postalveolar, palatal, velar, high-front & mid-front vowels, high-back & mid-back vowels, low vowel, word-initial and word-final) and post-vowel environment (including: nasal, stop, fricative, tap, approximant, labial, alveolar, postalveolar, palatal, velar, high-front & mid-front vowels, high-back & mid-back vowels and low vowel, word-initial and word-final), the part of speech of the word (including: noun, verb, adjective or adverb), if the vowel formed part of a root or suffix, language derivation (is the morpheme in question from Quichua or Spanish?), and if the vowel was found at a language switch
(i.e., *kom*$_{sp}$*i*$_{q}$*-nahun* 'they eat together'.)

I tried to find the best model with the lowest Bayesian Information Criterion (BIC) where each fixed effect predictor was still significant. Non-significant predictors

were removed from the model one-by-one, based on the closest t-value to zero, until only significant predictors remained.

Each of the following subsections includes a density plot of the residuals from its respective F1 mixed effects model. They include every possible variable except the contrast being discussed, e.g., the graphs are smoothed histograms summarizing how far away each vowel is from the best prediction of where it 'should' be according to a model that knows everything about the vowel except its language of origin (or its phoneme in its language of origin). It is important to note that the models that the graphs are based on contain all the possible predictors, not just those that are statistically significant (as in the models reported in the tables), therefore there is likely to be a great deal of overfitting to the data.[45]

6.3.1 PML Vowel Space Analysis: SP-Derived Vowels vs. Q-derived Vowels

The following subsections include the significant results from the pvals.fnc (top chart) and summary (bottom chart) of each mixed effects model. When a result is significant, we are most interested in the coefficient estimate (β), which is a conservative estimate of the average frequency distance in Hertz between Spanish-derived and Quichua-derived vowels.

[45] It is also important to note that some of those predictors are correlated with the contrast being investigated. For example, whether a vowel comes from a root or a suffix is fairly strongly correlated with whether its language of origin was Spanish or Quichua, so it is quite possible that a model is removing some of the variation that is really related to language of origin and incorrectly attributing that variation to the root/suffix distinction. For both these reasons, each graph illustrates the worst possible case for the hypothesis that the vowel classes are different. If despite those disadvantages we can still see a difference between, for example, Quichua-derived and Spanish-derived vowels in a graph, we can be fairly confident that the difference is real and that it probably really is due to the language of origin.

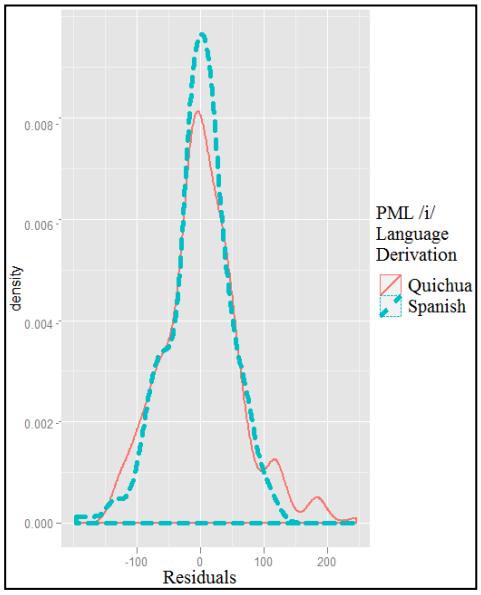
6.3.1.1 Spanish-Derived PML /i/ vs. Quichua-Derived PML /i/ - F1

This section compares the F1 frequencies of PML Spanish-derived /i/s like those found in the word [kinse] 'fifteen' (from Spanish *quince* 'fifteen'), with PML Quichua-derived /i/s similar to those found in the word [ablahuni] 'I am speaking'.

Table 32: SMLi vs. QMLi F1 - Pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	438.9	438.38	411.308	464.9991	0.0001	0
LanguageSML	-13.08	-12.54	-22.646	-2.4442	0.0142	0.0088
SexM	-112.86	-112.73	-154.041	-72.2834	0.0001	0
Pre_NasalsTRUE	32.28	31.54	19.057	42.8402	0.0001	0
Pre_TapTRUE	22.24	22.55	6.972	38.1961	0.0042	0.0047
Pre_AlveolarsTRUE	13.7	13.29	1.701	25.2096	0.0318	0.0206
Post_PostAlveolarsTRUE	-30.81	-30.63	-44.974	-16.5548	0.0001	0
Post_LowVowelTRUE	53.76	52.73	16.188	89.7739	0.0056	0.0048
Syllable_PreantepenultimateTRUE	-15.5	-15.37	-29.924	0.1274	0.0444	0.0406

Table 33: SMLi vs. QMLi - F1	Estimate	Std. Error	t value
(Intercept)	438.897	13.702	32.03
LanguageSML	-13.075	4.975	-2.63
SexM	-112.859	20.876	-5.41
Pre_NasalsTRUE	32.278	5.783	5.58
Pre_TapTRUE	22.237	7.836	2.84
Pre_AlveolarsTRUE	13.695	5.901	2.32
Post_PostAlveolarsTRUE	-30.808	7.222	-4.27
Post_LowVowelTRUE	53.756	18.977	2.83
PreantepenultimateTRUE	-15.498	7.552	-2.05

F1 for /i/ in Spanish-derived lexemes was significantly lower than that of Quichua-derived morphemes [t=-2.63, p=0.014, β=-13.0].



6.3.1.2 Spanish-Derived PML /i/ vs. Quichua-Derived PML /i/ - F2

This section compares the F2 frequencies of PML Spanish-derived /i/s like those found in the word [kinse] 'fifteen' (from Spanish *quince* 'fifteen'), with PML Quichua-derived /i/s similar to those found in the word [ablahuni] 'I am speaking'.

Table 34: SMLi vs. QMLi F2 - pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	2512.513	2510.376	2446.33	2573.652	0.0001	0
LanguageSML	-9.617	-0.289	-29.23	29.776	0.9968	0.551
SexM	-376.715	-377.649	-443.49	-310.616	0.0001	0
Pre_FricativesTRUE	-62.847	-58.479	-97.61	-16.715	0.0048	0.0038
Pre_TapTRUE	-167.569	-170.661	-230.55	-110.869	0.0001	0
Pre_LabialsTRUE	-95.455	-111.597	-163.42	-57.46	0.0001	0.001
Pre_AlveolarsTRUE	-111.855	-115.034	-167.93	-63.492	0.0001	0.0001
Pre_PostalveolarsTRUE	-91.952	-96.708	-158.66	-36.64	0.0024	0.0066
Pre_VelarsTRUE	-69.417	-66.255	-125.53	-5.982	0.0318	0.0357
Post_FricativesTRUE	-40.443	-37.296	-71.92	-2.684	0.0344	0.0259
Post_LabialsTRUE	-56.914	-58.419	-96.25	-20.597	0.0018	0.0042
Post_PalatalsTRUE	187.595	190.838	52.73	328.969	0.005	0.0086

Table 35:SMLi vs. QMLi - F2	Estimate	Std. Error	t value
(Intercept)	2512.513	32.618	77.03
LanguageSML	-9.617	16.119	-0.6
SexM	-376.715	29.826	-12.63
Pre_FricativesTRUE	-62.847	21.645	-2.9
Pre_TapTRUE	-167.569	32.901	-5.09
Pre_LabialsTRUE	-95.455	28.899	-3.3
Pre_AlveolarsTRUE	-111.855	28.998	-3.86
Pre_PostalveolarsTRUE	-91.952	33.759	-2.72
Pre_VelarsTRUE	-69.417	32.983	-2.1
Post_FricativesTRUE	-40.443	18.108	-2.23
Post_LabialsTRUE	-56.914	19.785	-2.88
Post_PalatalsTRUE	187.595	71.128	2.64

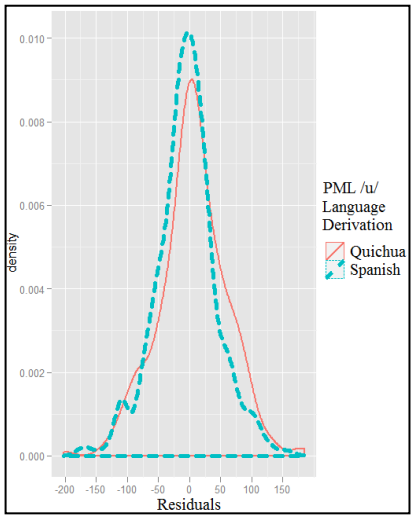
There was a non-significant difference between the F2 frequencies of /i/ in Spanish-derived and Quichua-derived morphemes in PML [t=-0.6, p=0.99, β=-9.6].

6.3.1.3 Spanish-Derived PML /u/ vs. Quichua-Derived PML /u/ - F1

This section compares the F1 frequencies of PML Spanish-derived /u/s like those found in the word [azulʒamaɾi] 'It really is just blue' (from Spanish *azul* 'blue'), with PML Quichua-derived /i/s similar to those found in the word [ablahuni] 'I am speaking'.

Table 36: SMLu vs. QMLu F1 - pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	504.73	508.75	472.86	544.18	0.0001	0
LanguageSML	-14.95	-19.02	-29.15	-9.099	0.0004	0.0142
SexM	-123.77	-122.83	-179.58	-67.4	0.0001	0.0013
Pre_PostalveolarsTRUE	-30.51	-33.53	-52.96	-14.415	0.0012	0.0052
Pre_PalatalTRUE	-63.86	-72.05	-99.06	-44.214	0.0001	0
Syllable_UltimateTRUE	-27.94	-25.16	-40.48	-8.987	0.0006	0.0008

Table 37:SMLu vs. QMLu - F1	Estimate	Std. Error	t value
(Intercept)	504.728	24.803	20.349
LanguageSML	-14.947	6.077	-2.459
SexM	-123.774	38.366	-3.226
Pre_PostalveolarsTRUE	-30.506	10.877	-2.805
Pre_PalatalTRUE	-63.858	15.465	-4.129
Syllable_UltimateTRUE	-27.942	8.309	-3.363



The F1 frequency for /u/ in Spanish-derived lexemes was significantly lower than that of Quichua-derived morphemes [t=-2.45, p=0.0004, β=-14.9].

6.3.1.4 Spanish-Derived PML /u/ vs. Quihua-Derived PML /u/ - F2

This section compares the F2 frequencies of PML Spanish-derived /u/s like those found in the word [azu̲lʒamaɾi] 'It really is just blue' (from Spanish *azul* 'blue'), with PML Quichua-derived /i/s similar to those found in the word [ablahu̲ni] 'I am speaking'.

Table 38: SMLu vs. QMLu F2 - pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	1044.695	1062.36	971.877	1150.533	0.0001	0
LanguageSML	4.899	-19.96	-60.462	21.704	0.3524	0.826
SexM	-126.225	-125.03	-248.775	-6.002	0.0434	0.044
Pre_TapTRUE	177.739	193.38	91.286	289.74	0.0001	0.0017
Pre_ApproxTRUE	-88.362	-88.82	-159.402	-16.845	0.0138	0.0281
Pre_AlveolarsTRUE	246.653	246.81	200.333	295.034	0.0001	0
Pre_PostalveolarsTRUE	337.725	329.67	262.099	399.535	0.0001	0
Pre_PalatalTRUE	415.774	412.15	313.339	513.301	0.0001	0
Post_TapTRUE	123.258	108.19	43.705	175.953	0.0004	0.0006
Post_AlveolarsTRUE	130.077	138.37	93.329	181.223	0.0001	0
Post_PostAlveolarsTRUE	143.964	120.94	54.886	189.421	0.0004	0.0002
Post_PalatalsTRUE	114.201	103.47	4.22	203.646	0.0406	0.0381
Post_HighFrontVowelsTRUE	323.51	336.85	78.836	596.063	0.0098	0.0125
End_of_WordTRUE	137.567	134.06	74.435	193.613	0.0001	0
Syllable_UltimateTRUE	-94.787	-103.22	-161.48	-49.729	0.0002	0.0012

Table 39: SMLu vs. QMLu - F2	Estimate	Std. Error	t value
(Intercept)	1044.695	47.433	22.025
LanguageSML	4.899	22.272	0.22
SexM	-126.225	62.531	-2.019
Pre_TapTRUE	177.739	56.222	3.161
Pre_ApproxTRUE	-88.362	40.135	-2.202
Pre_AlveolarsTRUE	246.653	27.122	9.094
Pre_PostalveolarsTRUE	337.725	39.159	8.624
Pre_PalatalTRUE	415.774	58.256	7.137
Post_TapTRUE	123.258	35.843	3.439
Post_AlveolarsTRUE	130.077	24.766	5.252
Post_PostAlveolarsTRUE	143.963	38.488	3.74
Post_PalatalsTRUE	114.2	54.943	2.079
Post_HighFrontVowelsTRUE	323.51	129.182	2.504
End_of_WordTRUE	137.567	33.042	4.163
Syllable_UltimateTRUE	-94.787	29.143	-3.252

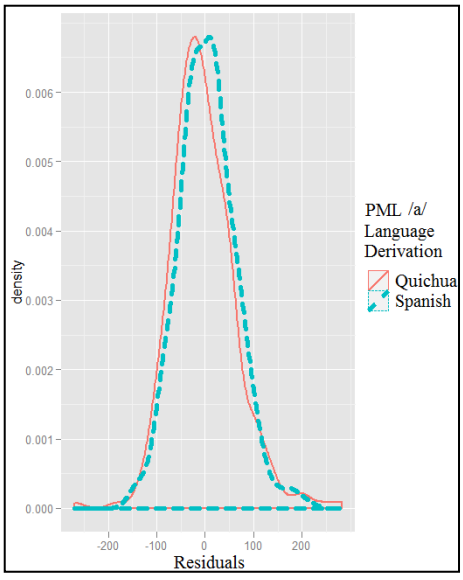
There was a non-significant difference between the F2 frequencies of /u/ in Spanish-derived and Quichua-derived morphemes in PML [t=0.22, p=0.35, β=4.8].

6.3.1.5 Spanish-Derived PML /a/ vs. Quichua-Derived PML /a/ - F1

This section compares the F1 frequencies of PML Spanish-derived /a/s like those found in the word [a̲zulɟamaɾi] ‘it really is just blue’ (from Spanish *azul* ‘blue’), with PML Quichua-derived /i/s similar to those found in the word [azulɟama̲ɾi] ‘it really is just blue’.

Table 40: SMLa vs. QMLa F1 - pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	717.96	718.07	682.9073	753.254	0.0001	0
LanguageSML	10.98	11.07	0.1997	21.91	0.0446	0.0477
SexM	-153.75	-153.7	-206.2037	-95.646	0.0001	0
Pre_FricativesTRUE	28.14	28.14	11.6427	45.097	0.0012	0.0009
Pre_AlveolarsTRUE	-15.36	-15.48	-26.5026	-3.522	0.0068	0.0089
Pre_PostalveolarsTRUE	-40.59	-40.69	-64.4377	-16.715	0.0012	0.0009
Beginning_of_WordTRUE	71.05	71.05	44.9284	99.425	0.0001	0
Post_PostAlveolarsTRUE	-38.39	-38.45	-59.9531	-17.894	0.0006	0.0004
Post_PalatalsTRUE	-35.62	-35.88	-66.8933	-7.326	0.0194	0.0187

Table 41: SMLa vs. QMLa - F1	Estimate	Std. Error	t value
(Intercept)	717.964	20.827	34.47
LanguageSML	10.978	5.534	1.98
SexM	-153.75	32.502	-4.73
Pre_FricativesTRUE	28.137	8.446	3.33
Pre_AlveolarsTRUE	-15.362	5.855	-2.62
Pre_PostalveolarsTRUE	-40.59	12.171	-3.33
Beginning_of_WordTRUE	71.05	13.773	5.16
Post_PostAlveolarsTRUE	-38.39	10.747	-3.57
Post_PalatalsTRUE	-35.618	15.105	-2.36



The F1 frequency for /a/ in Spanish-derived lexemes was significantly higher than that of Quichua-derived morphemes [t=1.98, p=0.04, β=10.9]

6.3.1.6 Spanish-Derived PML /a/ vs. Quichua-Derived PML /a/ - F2

This section compares the F2 frequencies of PML Spanish-derived /a/s like those found in the word [a̲zulʒamaɾi] 'it really is just blue' (from Spanish *azul* 'blue'), with PML Quichua-derived /i/s similar to those found in the word [azulʒama̲ɾi] 'it really is just blue'.

Table 42: SMLa vs. QMLa F2 - pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	1698.65	1697.2	1628.336	1764.54	0.0001	0
LanguageSML	-12.58	-10.4	-34.28	12.12	0.3722	0.3589
SexM	-238.64	-238.4	-319.771	-155.99	0.0001	0
Pre_TapTRUE	65.61	53.63	-6.024	112.59	0.0754	0.0415
Pre_ApproxTRUE	-99.94	-106.04	-143.002	-68.98	0.0001	0
Pre_LabialsTRUE	-60.05	-61.66	-109.435	-12.77	0.0118	0.0212
Pre_AlveolarsTRUE	88.35	89.31	43.765	137.33	0.0001	0.0005
Pre_PostalveolarsTRUE	207.05	206.87	146.33	267.16	0.0001	0
Pre_PalatalTRUE	326.38	325.83	220.297	434.51	0.0001	0
Pre_VelarsTRUE	74.56	84.91	34.711	132.1	0.0002	0.0051
Post_TapTRUE	64.66	66.62	23.545	108.91	0.002	0.006
Post_PostAlveolarsTRUE	93.16	93.46	52.837	136.65	0.0001	0
Post_PalatalsTRUE	161.02	146.92	86.718	206.59	0.0001	0
Post_HighFrontVowelsTRUE	152.2	118.4	-9.749	242.68	0.0714	0.0143
End_of_WordTRUE	36.44	35.5	5.949	62.97	0.0154	0.0115

Table 43: SMLa vs. QMLa - F2	Estimate	Std. Error	t value
(Intercept)	1698.65	34.12	49.79
LanguageSML	-12.58	13.7	-0.92
SexM	-238.64	37.07	-6.44
Pre_TapTRUE	65.61	32.13	2.04
Pre_ApproxTRUE	-99.94	21.17	-4.72
Pre_LabialsTRUE	-60.05	26	-2.31
Pre_AlveolarsTRUE	88.35	25.18	3.51
Pre_PostalveolarsTRUE	207.05	33.1	6.26
Pre_PalatalTRUE	326.38	56.12	5.82
Pre_VelarsTRUE	74.56	26.55	2.81
Post_TapTRUE	64.66	23.45	2.76
Post_PostAlveolarsTRUE	93.16	21.41	4.35
Post_PalatalsTRUE	161.02	30.87	5.22
Post_HighFrontVowelsTRUE	152.2	61.97	2.46
End_of_WordTRUE	36.44	14.37	2.54

There was a non-significant difference between the F2 frequencies of /a/ in Spanish-derived and Quichua-derived morphemes in PML [t=-0.92, p=0.37, β=-12.5].

6.3.2 PML Vowels Spanish-Derived vs. Quichua-Derived - Summary

The results of the statistical tests in section 6.3.1 reported significant differences in tongue body height (F1) in all three Spanish-derived vowels when compared with their Quichua counterparts. The differences in F1 frequency for the high vowels indicate a

subtle increase in tongue body height and a decrease in tongue body height for the low vowels. Yet when compared to the effects of neighbouring segments and other significant predictors, the F1 frequency differences are barely evident, since Spanish-derived high vowels are only slightly higher (lower F1) than their Quichua derived counterparts. The opposite is true for the low vowel. Table 44 shows the F1 frequency differences in Hertz between Spanish vowels and the intercept.

Vowel/Formant[46]	Avg. Spanish Frequency in Hertz[47]	Avg. Quichua Frequency in Herz[47]
/i/ - F1	425.8 HZ	438.8 HZ
/u/- F1	489.8 Hz	504.7 Hz
/a/ -F1	728.8 Hz	717.9 Hz

Table 44: Significant Hz differences: PML SP-dervied vowels compared to Q-derived vowels

The results of the statistical tests in section 6.3.1 reported non-significant differences in tongue body frontedness (F2) in all three Spanish-derived vowels when compared with their Quichua counterparts.

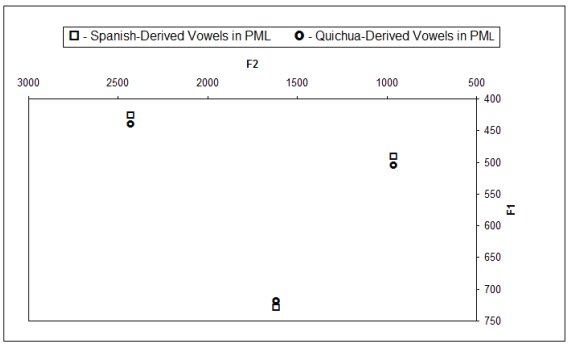


Figure 24: PML vowel chart of significant F1 and F2 results based on the coefficient estimate difference at the model intercept.

Although, the effects of language origin are quite subtle, they contrast with Imbabura Quichua's absence of effects as we will see in section 6.3.3.

[46] F2 results were non-significant
[47] Based on the coefficient estimates (β) from each F1 model.

6.3.3 IQ Vowel Space Analysis: SP-Derived Vowels vs. Native Q Vowels

The statistical tests reported in this section were designed to answer the question: is there a significant difference between Spanish-derived vowels and native Quichua vowels in Imbabura Quichua (IQ)?

Spanish-derived words in IQ are similar to those in PML in that they typically underwent the process of relexification (see section 1), i.e., they are not taken from L1 Quichua speakers speaking Spanish or part of code-switching phrases.

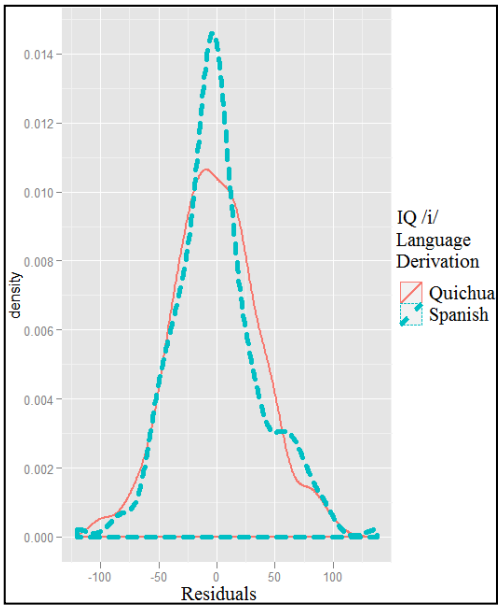
6.3.3.1 Spanish-Derived IQ /i/ vs. Native IQ /i/ - F1

This section compares the F1 frequencies of IQ Spanish-derived /i/s like those found in the word [amigumi] 'friend+VAL' (from Spanish *amigo* 'friend), with IQ native Quichua /i/s similar to those found in the word [asinajan] 'they laugh together'.

Table 45 SIQi vs. QIQi F1 - pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	433.092	433.121	414.867	451.646	0.0001	0
Language_CodeSIQ	-1.717	-1.931	-9.449	5.784	0.6184	0.6659
SexM	-110.712	-110.607	-136.559	-82.494	0.0001	0
Pre_NasalsTRUE	31.276	31.031	21.386	41.14	0.0001	0
Pre_LabialsTRUE	-11.272	-11.296	-19.79	-2.767	0.0082	0.0133
Pre_VelarsTRUE	-17.951	-17.898	-28.488	-7.479	0.0004	0.0011
Post_NasalsTRUE	14.284	14.358	4.119	23.891	0.0044	0.005
Post_StopsTRUE	-14.907	-14.716	-24.099	-5.355	0.002	0.0023
Post_PostAlveolarsTRUE	-17.397	-17.579	-27.575	-6.728	0.001	0.0012
Syllable_PenultimateTRUE	13.451	13.715	5.603	21.201	0.0004	0.0007

Table 46: SIQi vs. QIQi - F1	Estimate	Std. Error	t value
(Intercept)	433.092	9.278	46.68
Language_CodeSIQ	-1.717	3.973	-0.43
SexM	-110.712	13.548	-8.17
Pre_NasalsTRUE	31.276	5.209	6
Pre_LabialsTRUE	-11.272	4.536	-2.48
Pre_VelarsTRUE	-17.952	5.46	-3.29
Post_NasalsTRUE	14.284	5.062	2.82
Post_StopsTRUE	-14.907	4.874	-3.06
Post_PostAlveolarsTRUE	-17.397	5.355	-3.25
Syllable_PenultimateTRUE	13.451	3.946	3.41

There was a non-significant difference between the F1 frequencies of /i/ in Spanish-derived and Quichua-derived morphemes in IQ [t=-0.43, p=0.61, β=-1.7].



6.3.3.2 Spanish-Derived IQ /i/ vs. Native IQ /i/ - F2

This section compares the F2 frequencies of IQ Spanish-derived /i/s like those found in the word [amigumi] 'friend+VAL' (from Spanish *amigo* 'friend'), with IQ native Quichua /i/s similar to those found in the word [asinajan] 'they laugh together'.

Table 47: SIQi vs. QIQi F2 - pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	2676.045	2670.7536	2593.04	2754.959	0.0001	0
Language_CodeSIQ	-0.4005	0.3231	-28.37	30.374	0.9846	0.9809
SexM	-259.381	-258.1168	-367.31	-142.251	0.0001	0.0002
Pre_TapTRUE	-208.35	-206.7597	-250.73	-166.077	0.0001	0
Pre_LabialsTRUE	-88.8786	-83.9069	-118.67	-48.403	0.0001	0
Pre_AlveolarsTRUE	-138.245	-131.8866	-165.69	-98.285	0.0001	0
Pre_PostalveolarsTRUE	-105.302	-97.9164	-143.06	-49.907	0.0002	0.0001
Post_FricativesTRUE	-87.9236	-84.0777	-128.11	-37.592	0.0004	0.0004
Post_TapTRUE	-199.037	-203.5587	-257.75	-144.288	0.0001	0
Post_LabialsTRUE	-121.204	-118.0629	-159.08	-79.415	0.0001	0
Post_AlveolarsTRUE	-67.5378	-72.9755	-108.53	-40.784	0.0001	0.0003
Post_PostAlveolarsTRUE	-48.8173	-52.1126	-92.86	-11.624	0.012	0.0275
Post_HighBackVowelsTRUE	-224.949	-219.3096	-404.17	-45.294	0.016	0.0112
End_of_WordTRUE	-92.8247	-98.3837	-141.25	-54.137	0.0001	0.0001
PoS_NounTRUE	-39.5789	-35.872	-62.1	-9.564	0.009	0.0068

Table 48: SIQi vs. QIQi - F2	Estimate	Std. Error	t value
(Intercept)	2676.045	49.2015	54.39
Language_CodeSIQ	-0.4005	16.7343	-0.02
SexM	-259.381	70.1683	-3.7
Pre_TapTRUE	-208.35	23.8638	-8.73
Pre_LabialsTRUE	-88.8786	20.6328	-4.31
Pre_AlveolarsTRUE	-138.245	19.9448	-6.93
Pre_PostalveolarsTRUE	-105.302	27.1131	-3.88
Post_FricativesTRUE	-87.9236	24.6064	-3.57
Post_TapTRUE	-199.037	30.0169	-6.63
Post_LabialsTRUE	-121.204	21.8251	-5.55
Post_AlveolarsTRUE	-67.5378	18.4366	-3.66
Post_PostAlveolarsTRUE	-48.8173	22.0872	-2.21
Post_HighBackVowelsTRUE	-224.949	88.3912	-2.54
End_of_WordTRUE	-92.8247	23.8525	-3.89
PoS_NounTRUE	-39.5789	14.563	-2.72

There was a non-significant difference between the F2 frequencies of /i/ in Spanish-derived and Quichua-derived morphemes in IQ [t=-0.02, p=0.98, β=-0.4].

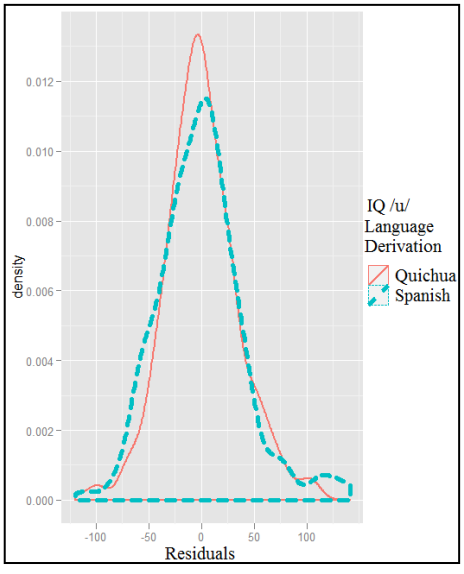
6.3.3.3 Spanish-Derived IQ /u/ vs. Native IQ /u/ - F1

This section compares the F1 frequencies of IQ Spanish-derived /u/s like those found in the word [bu̱ʒu] ‘donkey’ (from Spanish *burro* ‘donkey’), with IQ native Quichua /u/s similar to those found in the word [pu̱sak] ‘eight’.

Table 49: SIQu vs. QIQu F1 - Pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	457.727	458.512	438.252	480.94	0.0001	0
Language_CodeSIQ	4.297	4.918	-4.288	13.88	0.2878	0.4247
SexM	-97.504	-97.327	-131.235	-64.94	0.0001	0
Post_NasalsTRUE	21.837	20.405	10.953	29.75	0.0001	0.0001
Post_TapTRUE	17.049	17.405	5.441	30.88	0.0064	0.0197
Post_VelarsTRUE	-18.647	-21.648	-35.258	-7.77	0.003	0.0107

Table 50: SIQu vs. QIQu- F1	Estimate	Std. Error	t value
(Intercept)	457.727	12.351	37.06
Language_CodeSIQ	4.297	5.378	0.8
SexM	-97.504	18.655	-5.23
Post_NasalsTRUE	21.837	5.362	4.07
Post_TapTRUE	17.049	7.289	2.34
Post_VelarsTRUE	-18.647	7.28	-2.56

There was a non-significant difference between the F1 frequencies of /u/ in Spanish-derived and Quichua-derived morphemes in IQ [t=0.8, p=0.28, β=4.2].



6.3.3.4 Spanish-Derived IQ /u/ vs. Native IQ /u/ - F2

This section compares the F2 frequencies of IQ Spanish-derived /u/s like those found in the word [bu̱ʒu] 'donkey' (from Spanish *burro* 'donkey'), with IQ native Quichua /u/s similar to those found in the word [pu̱sak] 'eight'.

Table 51: SIQu vs. QIQu F2 - Pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	1210.95	1210.41	965.37	1462.269	0.0001	0
Language_CodeSIQ	-40.86	-47.35	-90.65	-2.998	0.0382	0.1064
Pre_TapTRUE	93.2	87.84	11.65	161.805	0.026	0.0414
Pre_AlveolarsTRUE	163.01	163.34	119.26	207.44	0.0001	0
Pre_PostalveolarsTRUE	334.81	348.42	270.37	417.915	0.0001	0
Post_StopsTRUE	116.28	121.57	71.98	172.822	0.0001	0.0001
Post_FricativesTRUE	90.77	94.7	34.68	159.053	0.003	0.0101
Post_TapTRUE	106.19	110.4	45.4	172.661	0.0016	0.0028
Post_AlveolarsTRUE	92.92	96.17	47.56	139.109	0.0001	0.0004
Post_PostAlveolarsTRUE	131.75	128.06	62.49	192.062	0.0004	0.0003
Post_VelarsTRUE	-109.99	-120.39	-192.46	-48.403	0.0012	0.0048
End_of_WordTRUE	175.05	170.18	71.38	257.984	0.0006	0.0006
PoS_NounTRUE	-266.12	-262.08	-494.31	-24.558	0.0298	0.0261
PoS_AdjectiveTRUE	-308.96	-316.87	-565.24	-75.347	0.012	0.0129
PoS_AdverbTRUE	-275.78	-285.17	-532.01	-34.418	0.0254	0.0332
PoS_VerbTRUE	-272.62	-270.03	-499.12	-31.201	0.0248	0.0224
Syllable_UltimateTRUE	-113.22	-117.01	-191.75	-50.779	0.0016	0.0025
Syllable_PenultimateTRUE	-44.47	-46.73	-81.64	-11.866	0.008	0.0152

Table 52: SIQu vs. QIQu- F2	Estimate	Std. Error	t value
(Intercept)	1210.95	127.76	9.479
Language_CodeSIQ	-40.86	25.26	-1.618
Pre_TapTRUE	93.21	45.58	2.045
Pre_AlveolarsTRUE	163.01	25.93	6.286
Pre_PostalveolarsTRUE	334.81	41.52	8.064
Post_StopsTRUE	116.28	28.83	4.033
Post_FricativesTRUE	90.77	35.14	2.583
Post_TapTRUE	106.19	35.37	3.002
Post_AlveolarsTRUE	92.92	26.04	3.568
Post_PostAlveolarsTRUE	131.75	36.49	3.61
Post_VelarsTRUE	-109.99	38.78	-2.836
End_of_WordTRUE	175.05	50.63	3.458
PoS_NounTRUE	-266.12	119.25	-2.232
PoS_AdjectiveTRUE	-308.96	123.75	-2.497
PoS_AdverbTRUE	-275.78	129.12	-2.136
PoS_VerbTRUE	-272.62	118.95	-2.292
Syllable_UltimateTRUE	-113.22	37.28	-3.037
Syllable_PenultimateTRUE	-44.47	18.25	-2.437

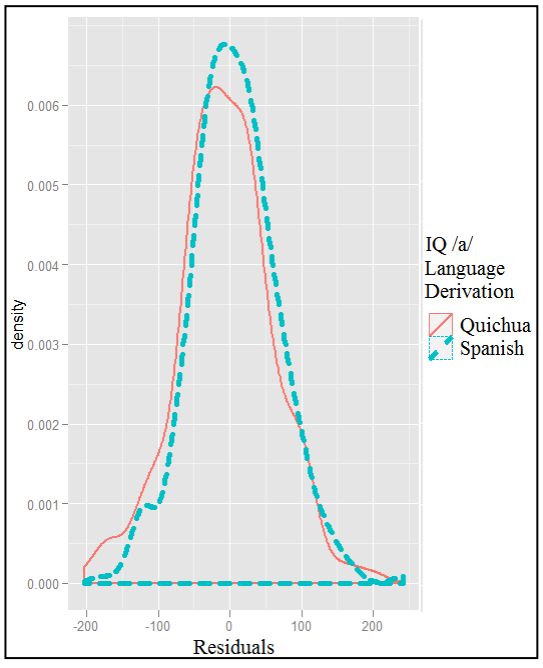
There was a non-significant difference between the F2 frequencies of /u/ in Spanish-derived and Quichua-derived morphemes in IQ [t=-1.6, p=0.03, β=-40.8].

6.3.3.5 Spanish-Derived IQ /a/ vs. Native IQ /a/ - F1

This section compares the F1 frequencies of IQ Spanish-derived /a /s like those found in the word [amigumi] 'friend+VAL' (from Spanish *amigo* 'friend'), with IQ native Quichua /u/s similar to those found in the word [pusak] 'eight'.

Table 53: SIQa vs. QIQa F1 - Pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	683.8	684.08	641.5919	725.763	0.0001	0
Language_CodeSIQ	11.27	11.55	0.1043	22.855	0.045	0.0872
SexM	-113.85	-115.08	-178.2638	-55.231	0.0014	0.0026
Pre_NasalsTRUE	75.73	69.41	31.2036	107.602	0.0004	0.0003
Pre_StopsTRUE	53.9	46.5	9.3276	83.906	0.013	0.0074
Pre_FricativesTRUE	47.26	45.68	21.9602	70.824	0.0002	0.0005
Pre_ApproxTRUE	73.81	69.63	27.575	111.572	0.0004	0.0015
Pre_LabialsTRUE	-50.03	-42.52	-80.1602	-5.57	0.0254	0.0134
Pre_AlveolarsTRUE	-50.48	-43.13	-78.1062	-6.143	0.0174	0.0095
Pre_PostalveolarsTRUE	-54.71	-52.29	-78.5091	-27.756	0.0001	0.0001
Pre_VelarsTRUE	-45.87	-37.6	-76.6874	1.153	0.0564	0.028
Beginning_of_WordTRUE	111.56	108.53	74.1372	142.089	0.0001	0
Post_PostAlveolarsTRUE	-37.93	-36.69	-56.7784	-16.269	0.0001	0.0007
Post_HighBackVowelsTRUE	145.39	151.27	15.0538	281.479	0.0292	0.0288
PreantepenultimateTRUE	-20.46	-21.84	-40.1746	-4.428	0.0164	0.0245

Table 54:SIQa vs. QIQa- F1	Estimate	Std. Error	t value
(Intercept)	683.8	25.606	26.704
Language_CodeSIQ	11.275	6.581	1.713
SexM	-113.85	37.66	-3.023
Pre_NasalsTRUE	75.728	20.786	3.643
Pre_StopsTRUE	53.897	20.047	2.689
Pre_FricativesTRUE	47.256	13.585	3.478
Pre_ApproxTRUE	73.812	23.1	3.195
Pre_LabialsTRUE	-50.035	20.176	-2.48
Pre_AlveolarsTRUE	-50.477	19.415	-2.6
Pre_PostalveolarsTRUE	-54.713	13.924	-3.929
Pre_VelarsTRUE	-45.866	20.819	-2.203
Beginning_of_WordTRUE	111.559	18.28	6.103
Post_PostAlveolarsTRUE	-37.934	11.121	-3.411
Post_HighBackVowelsTRUE	145.394	66.346	2.191
PreantepenultimateTRUE	-20.463	9.073	-2.255



The F1 frequency for /a/ in Spanish-derived morphemes was significantly higher than that of Quichua-derived morphemes [t=1.71, p=0.045, β=11.2]. I am not fully convinced of this result for two reasons: (1), the t-value is suspiciously small (within +/-2 is usually

not significant with large datasets) and (2) the P_{MCMC} value is just below .05. P-value results tend to differ slightly across runs using Monte-Carlo Markov chain sampling. In order to avoid data-mining, I also restricted each model to only one run of *pvals.fnc*. I did not make any corrections for multiple comparisons by using methods such as Bonferroni's correction, Scheffé's test or Tukey's Honesty Significant Difference. Therefore, I consider this result not to be strong evidence for a difference between Spanish-derived and Quichua-derived /a/s in IQ. If this effect is real, it is the biggest F1 difference one will find in IQ.

6.3.3.6 Spanish-Derived IQ /a/ vs. Native IQ /a/ - F2

This section compares the F2 frequencies of IQ Spanish-derived /a/s like those found in the word [amigumi] 'friend+VAL' (from Spanish *amigo* 'friend'), with IQ native Quichua /u/s similar to those found in the word [pusak] 'eight'.

Table 55: SIQa vs. QIQa F2 - Pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	1823.69	1825.11	1752.466	1902.742	0.0001	0
Language_CodeSIQ	-14.67	-20.73	-46.81	7.202	0.133	0.3449
SexM	-272.26	-272.17	-383.136	-157.265	0.0002	0.0001
Pre_LabialsTRUE	-169.98	-169.56	-200.459	-138.225	0.0001	0
Pre_PostalveolarsTRUE	114.68	115.33	77.299	155.039	0.0001	0
Post_AlveolarsTRUE	32.31	34.77	9.176	61.385	0.0084	0.0183
Post_PostAlveolarsTRUE	85.95	80.96	35.28	125.575	0.0002	0.0005
Post_PalatalsTRUE	145.37	129.97	34.517	220.199	0.0068	0.0036
Post_VelarsTRUE	47.55	52.29	16.812	87.865	0.004	0.0104
Syllable_PreantepenultimateTRUE	-47.43	-43.99	-79.329	-7.373	0.0168	0.0097
Syllable_UltrapreantepenultimateTRUE	-65.56	-72.1	-131.082	-12.126	0.0166	0.0264

Table 56: SIQa vs. QIQa- F2	Estimate	Std. Error	t value
(Intercept)	1823.69	44.7	40.8
Language_CodeSIQ	-14.67	15.52	-0.95
SexM	-272.26	67.65	-4.02
Pre_LabialsTRUE	-169.98	16.88	-10.07
Pre_PostalveolarsTRUE	114.68	22.3	5.14
Post_AlveolarsTRUE	32.31	13.66	2.37
Post_PostAlveolarsTRUE	85.95	24.5	3.51
Post_PalatalsTRUE	145.37	49.78	2.92
Post_VelarsTRUE	47.55	18.49	2.57
Syllable_PreantepenultimateTRUE	-47.43	18.27	-2.6
Syllable_UltrapreantepenultimateTRUE	-65.56	29.45	-2.23

There was a non-significant difference between the F2 frequencies of /a/ in Spanish-derived and Quichua-derived morphemes in IQ [t=-0.95, p=0.13, β=-14.6].

6.3.4 Spanish-Derived IQ Vowels vs. Native IQ Vowels - Summary

The results of the statistical tests in section 6.3.3 reported non-significant differences in tongue body height (F1) and non-significant differences in tongue body frontedness (F2) between Spanish-derived vowels and their native Quichua counterparts, with the dubious exception of the F1 frequency in Spanish-derived /a/ (see section 6.3.3.5). These non-significant findings contrast with the small but significant differences for the same tests in PML. This will be further discussed in section 7.

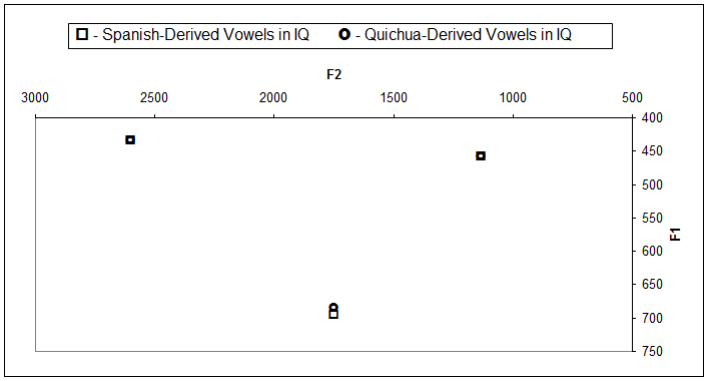


Figure 25: IQ vowel chart of significant F1 and F2 results based on the coefficient estimate difference at the model intercept.

6.3.5 PML Vowel Space Analyses: SP-Derived High and Mid vowels

The statistical tests reported in this section were designed to answer the question: is there a statistically significant difference between Spanish-derived high vowels and Spanish-derived mid vowels in PML?

This question is of interest for a number of reasons: (1) No one has yet taken acoustic measurements from Media Lengua, and therefore we cannot know to what extent Spanish phonological contrasts, i.e., the degree to which PML has incorporated a separate set of mid vowels into its phonology, have crossed over into Media Lengua. (2) To my knowledge, a mixed language has not been tested using acoustic measurements and statistics to determine the existence of dual vowel system. While data from section 6.3.1 shows Spanish-derived vowels and Quichua-derived vowels have not completely merged, the addition of Spanish-derived mid vowels would provide even more evidence for two co-existing systems. (3) Impressionistic observations from other Media Lengua varieties suggest that speakers of ML completely assimilate Spanish-derived vowels.[48] My own impressionistic observations, however, are at odds with this information, as I have noticed an overwhelming tendency for speakers to use mid vowels in PML. (4) The adoption of the Spanish mid vowels and diphthongs could be a practical strategy for dealing with homophony and ambiguities that might otherwise arise though Quichua vowel assimilation.

[48] As noted in section 4.2

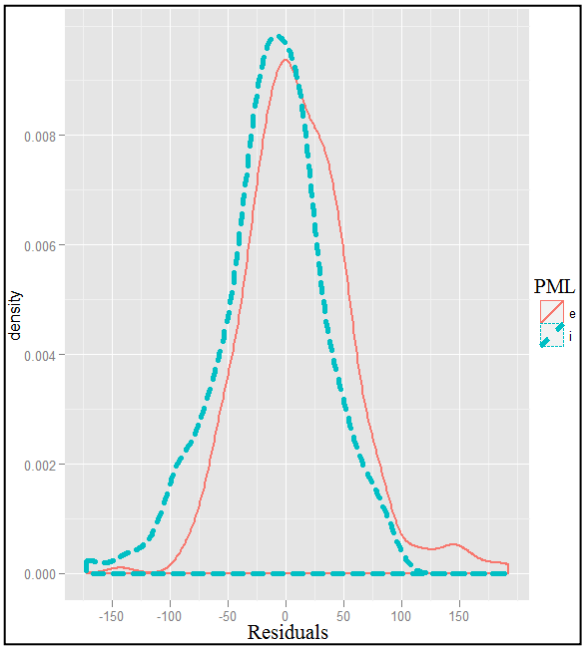
6.3.5.1 Spanish-Derived PML /i/ vs. Spanish-Derived PML /e/ - F1

This section compares the F1 frequencies of PML Spanish-derived /i/s like those found in the word [pi̲ntuɾkunaka] 'painters' (from Spanish *pintor* 'painter'), with PML Spanish-derived /e/s similar to those found in the word [e̲skɾibiʧunmi] 'in order to write' (from Spanish *escribir* 'to write').

Table 57: SMLi vs SMLe F1 - Pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	472.64	472.9	442.8189	501.76	0.0001	0
Voweli	-43.76	-43.82	-52.7623	-35.073	0.0001	0
SexM	-119.75	-120.23	-166.2879	-75.47	0.0001	0
Pre_NasalsTRUE	28.8	29.13	16.2328	41.581	0.0001	0
Pre_VelarsTRUE	-38.77	-38.53	-52.3522	-23.553	0.0001	0
Pre_LowVowelTRUE	79.09	79.46	0.7742	154.72	0.0428	0.0445
Post_NasalsTRUE	16.05	16.18	6.2516	26.1	0.0004	0.0016
Post_TapTRUE	40.25	40.33	22.6593	57.566	0.0001	0
PoS_AdverbTRUE	22.93	22.92	7.2097	38.831	0.0056	0.0046
PreantepenultimateTRUE	-15.36	-15.29	-25.8648	-4.603	0.0038	0.0043

Table 58: SMLi vs SMLe- F1	Estimate	Std. Error	t value
(Intercept)	472.641	16.252	29.082
Voweli	-43.765	4.464	-9.804
SexM	-119.747	25.226	-4.747
Pre_NasalsTRUE	28.799	6.274	4.59
Pre_VelarsTRUE	-38.766	7.228	-5.363
Pre_LowVowelTRUE	79.088	39.288	2.013
Post_NasalsTRUE	16.05	5.054	3.175
Post_TapTRUE	40.245	8.779	4.584
PoS_AdverbTRUE	22.927	8.057	2.846
PreantepenultimateTRUE	-15.36	5.358	-2.867

The F1 frequency in Spanish-derived /i/ was significantly lower than that of Spanish-derived /e/ in PML morphemes [t=-9.804, p<0.0001, β=-43.7].



6.3.5.2 Spanish-Derived PML /i/ vs. Spanish-Derived PML /e/ - F2

This section compares the F2 frequencies of PML Spanish-derived /i/s like those found in the word [pi̲ntuɾkunaka] 'painters' (from Spanish *pintor* 'painter'), with PML Spanish-derived /e/s similar to those found in the word [e̲skɾibiʧunmi] 'in order to write' (from Spanish *escribir* 'to write').

Table 59: SMLi vs SMLe F2 - Pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	2342.25	2352.69	2303.58	2408.58	0.0001	0
Voweli	111.82	111.2	84.68	137.07	0.0001	0
SexM	-366.55	-365.61	-427.32	-306.17	0.0001	0
Pre_FricativesTRUE	-62.7	-71.05	-102.54	-37.7	0.0001	0.0006
Pre_TapTRUE	-122.93	-124.24	-166.43	-79.82	0.0001	0
Post_StopsTRUE	-38.57	-51.13	-83.55	-16.91	0.002	0.0373
Post_FricativesTRUE	-60.76	-72.55	-106.84	-38.64	0.0001	0.0009
Post_TapTRUE	-134.78	-126.49	-185.42	-68.71	0.0001	0
Post_LabialsTRUE	-82.14	-81.49	-123.79	-38.29	0.0001	0.0005
Post_AlveolarsTRUE	-46.69	-45.26	-76.17	-12.54	0.0044	0.0061
PoS_VerbTRUE	44.66	44.01	17.15	72.63	0.0028	0.008

Table 60: SMLi vs SMLe - F2	Estimate	Std. Error	t value
(Intercept)	2342.25	26.34	88.94
Voweli	111.82	15.29	7.31
SexM	-366.55	26.43	-13.87
Pre_FricativesTRUE	-62.7	18.07	-3.47
Pre_TapTRUE	-122.93	23.63	-5.2
Post_StopsTRUE	-38.57	18.48	-2.09
Post_FricativesTRUE	-60.76	18.18	-3.34
Post_TapTRUE	-134.78	31.73	-4.25
Post_LabialsTRUE	-82.14	23.4	-3.51
Post_AlveolarsTRUE	-46.69	16.96	-2.75
PoS_VerbTRUE	44.66	16.79	2.66

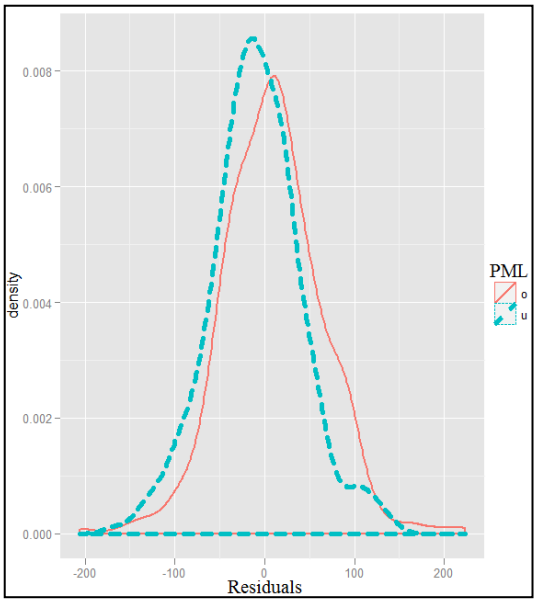
The F2 frequency in Spanish-derived /i/ was significantly higher than that of Spanish-derived /e/ in PML morphemes [$t=7.31$, $p<0.0001$, $\beta=111.8$].

6.3.5.3 Spanish-Derived PML /u/ vs. Spanish-Derived PML /o/ - F1

This section compares the F1 frequencies of PML Spanish-derived /u/s like those found in the word [fɾu̲tatata] 'fruit+ACC+WH-Q' (from Spanish *fruta* 'fruit'*)*, with PML Spanish-derived /o/s similar to those found in the word [puebl*o̲*manmi] 'to the town+VAL' (from Spanish *pueblo* 'town').

Table 61: SMLu vs SMLo F1 - Pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	503.47	502.94	469.725	537.09	0.0001	0
Vowelu	-37.61	-37.71	-46.411	-28.91	0.0001	0
SexM	-109.64	-109.18	-159.347	-57.87	0.0002	0.0013
Pre_StopsTRUE	13.56	13.81	3.226	24.37	0.0118	0.0114
Pre_FricativesTRUE	26.49	26.84	11.511	41.74	0.0006	0.0006
Pre_ApproxTRUE	19.36	19.52	4.318	35.9	0.0156	0.0171
Pre_PostalveolarsTRUE	-40.2	-40.15	-68.162	-10.77	0.0064	0.0059
Post_LowVowelTRUE	79.8	80.6	29.405	128.31	0.0016	0.0015
PoS_AdjectiveTRUE	15.91	15.88	2.375	29.32	0.0206	0.0195

Table 62: SMLu vs SMLo- F1	Estimate	Std. Error	t value
(Intercept)	503.471	21.864	23.028
Vowelu	-37.612	4.492	-8.373
SexM	-109.636	33.874	-3.237
Pre_StopsTRUE	13.558	5.34	2.539
Pre_FricativesTRUE	26.491	7.628	3.473
Pre_ApproxTRUE	19.362	8.095	2.392
Pre_PostalveolarsTRUE	-40.197	14.547	-2.763
Post_LowVowelTRUE	79.803	24.955	3.198
PoS_AdjectiveTRUE	15.908	6.792	2.342



The F1 frequency in Spanish-derived /u/ was significantly lower than that of Spanish-derived /o/ in PML morphemes [t=-8.373, p<0.0001, β=-37.6].

6.3.5.4 Spanish-Derived PML /u/ vs. Spanish-Derived PML /o/ - F2

This section compares the F2 frequencies of PML Spanish-derived /u/s like those found in the word [frutatata] 'fruit+ACC+WH-Q' (from Spanish *fruta* 'fruit'), with PML Spanish-derived /o/s similar to those found in the word [pueblomanmi] 'to the town+VAL' (from Spanish *pueblo* 'town').

Table 63: SMLu vs SMLo F2 - Pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	1289.695	1288.313	1204.51	1375.63	0.0001	0
Vowelu	-0.0001	-4.924	-33.77	22.85	0.7322	1
SexM	-160.914	-159.273	-273.18	-51.25	0.0098	0.0054
Pre_NasalsTRUE	-172.518	-179.225	-244.5	-113.53	0.0001	0
Pre_StopsTRUE	-152.344	-151.651	-207.24	-96.07	0.0001	0
Pre_FricativesTRUE	-156.366	-160.037	-225.24	-98.77	0.0001	0
Pre_ApproxTRUE	-234.37	-227.933	-303.17	-151.03	0.0001	0
Pre_AlveolarsTRUE	235.4547	232.845	199.11	267.6	0.0001	0
Pre_PostalveolarsTRUE	238.4598	249.547	161.65	336.39	0.0001	0
Pre_PalatalTRUE	268.8959	278.922	184.3	375.62	0.0001	0
Pre_LowVowelTRUE	-234.86	-288.095	-441.22	-130.72	0.0002	0.0052
Beginning_of_WordTRUE	-189.8	-204.051	-280.65	-129.23	0.0001	0
Post_NasalsTRUE	-79.8318	-78.078	-110.27	-45.01	0.0001	0
Post_TapTRUE	98.6696	83.623	34.1	134.33	0.0012	0.0006
Post_ApproxTRUE	-154.837	-151.639	-216.38	-88.79	0.0001	0
Post_AlveolarsTRUE	134.745	143.773	112.8	172.85	0.0001	0
Post_PalatalsTRUE	169.2484	164.723	43.82	284.13	0.0078	0.0105

Table 64: SMLu vs SMLo- F2	Estimate	Std. Error	t value
(Intercept)	1290	4.60E+01	28.042
Vowelu	-7.8E-05	1.60E+01	0
SexM	-160.9	5.77E+01	-2.79
Pre_NasalsTRUE	-172.5	3.64E+01	-4.742
Pre_StopsTRUE	-152.3	3.09E+01	-4.938
Pre_FricativesTRUE	-156.4	3.45E+01	-4.536
Pre_ApproxTRUE	-234.4	4.22E+01	-5.551
Pre_AlveolarsTRUE	235.5	1.90E+01	12.401
Pre_PostalveolarsTRUE	238.5	4.77E+01	4.995
Pre_PalatalTRUE	268.9	5.71E+01	4.71
Pre_LowVowelTRUE	-234.9	8.37E+01	-2.805
Beginning_of_WordTRUE	-189.8	4.25E+01	-4.469
Post_NasalsTRUE	-79.83	1.88E+01	-4.253
Post_TapTRUE	98.67	2.84E+01	3.469
Post_ApproxTRUE	-154.8	3.61E+01	-4.288
Post_AlveolarsTRUE	134.7	1.69E+01	7.976
Post_PalatalsTRUE	169.2	6.59E+01	2.568

There was a non-significant difference between the F2 frequency for Spanish-derived /u/ and Spanish-derived /o/ in PML morphemes [t=0, p=0.7322, β=-0.0001].

6.3.6 PML Spanish-Derived High Vowels vs. Mid Vowels - Summary

The results of the statistical tests in section 6.3.5 reported significant differences in tongue body height between PML Spanish-derived high vowels and PML mid vowels. Unlike, the subtle F1 frequency differences found between Spanish-derived and Quichua-derived vowels (see section 6.3.1) when compared to the effects of neighbouring segments and other significant predictors, the F1 frequency differences between the PML high vowels and mid vowels are quite apparent. The F2 frequencies between PML /i/ and

/e/ were also significantly different. The F2 frequency differences were also comparable in size to the effects of neighbouring segments and other significant predictors. A non-significant F2 frequency difference was reported between PML /u/ and /o/.

These effects are not being caused by a handful of clear mid-tokens that are dragging the average up and down – rather the entire distribution for /e/ and /o/ has been shifted over relative to /i/ and /u/. Table 65 shows the F1 frequency differences in Hertz between PML high vowels and the intercept.

Formant	Avg. Spanish /i/ Frequency in Hertz[49]	Avg. Spanish /e/ Frequency in Herz[49]
F1	428.9 Hz	472.6 Hz
F2	2453.82	2342.2 Hz
F1	465.8 Hz	503.4 Hz
Formant	Avg. Spanish /u/ Frequency in Hertz[49]	Avg. Spanish /o/ Frequency in Herz[49]
F1	465.8 Hz	503.4 Hz
F2	Non-Significant	Non-Significant

Table 65: Significant Hz difference: PML SP-dervied high vowels compared to SP-derived mid vowels

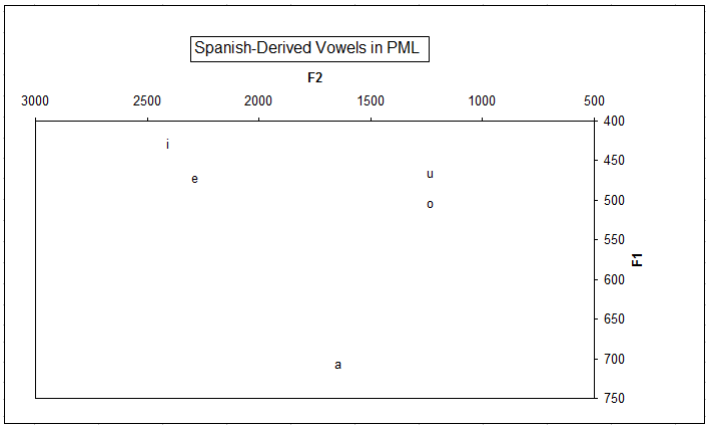


Figure 26: PML high/mid vowel chart of significant F1 and F2 results based on the coefficient estimate difference at the model intercept.

[49] Based on the coefficient estimates (β) from each model that rendered a significant result.

6.3.7 IQ Vowel Space Analyses: SP-Derived High vowels vs. Mid vowels

The statistical tests reported in this section were designed to answer the question: is there a statistically significant difference between Spanish-derived high vowels and Spanish-derived mid vowels in IQ?

This question is similar to the one found in section 6.3.5 and important for essentially the same reasons: (1) to my knowledge, no one has yet worked with acoustic data from Spanish-derived lexemes in Quichua. Therefore, we cannot know to what extent Spanish phonotatics have crossed over into Quichua. (2) Data from PML and IQ will give us a platform to compare the amount of dispersion among Spanish-derived mid vowels in both languages. (3) The answers to these questions will provide evidence as to how many vowels Quichua actually contains.

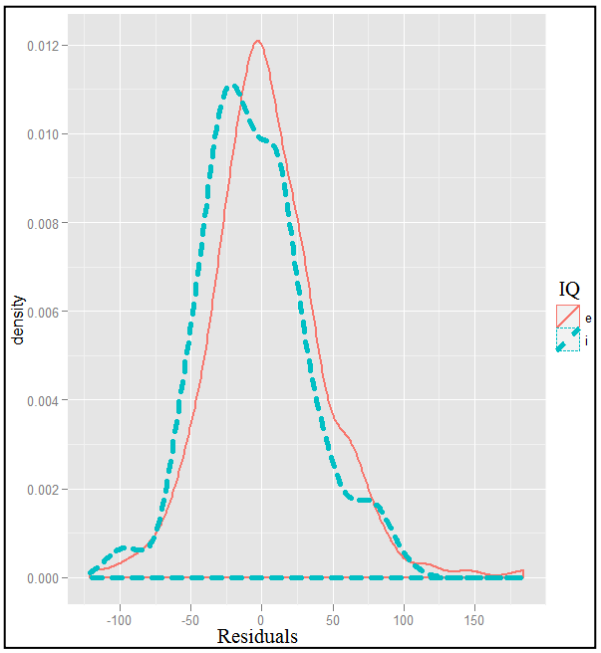
6.3.7.1 Spanish-Derived IQ /i/ vs. Spanish-Derived IQ /e/ - F1

This section compares the F1 frequencies of IQ Spanish-derived /i/s like those found in the word [amigumi] 'friend+VAL' (from Spanish *amigo* 'friend'), with IQ Spanish-derived /e/s similar to those found in the word [kuadernuta] 'notebook+ACC' (from Spanish *cuaderno* 'notebook').

Table 66: SIQi vs SIQe F1 - Pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	480.73	483.06	462.63	502.921	0.0001	0
Voweli	-26.69	-27.58	-37.52	-17.61	0.0001	0
SexM	-96.04	-96.51	-126.93	-68.225	0.0001	0
Post_StopsTRUE	-40.13	-41.39	-53.33	-29.663	0.0001	0
Post_FricativesTRUE	-15.01	-14.24	-26.64	-2.663	0.0182	0.0208
Post_AlveolarsTRUE	-13.51	-15.76	-26.01	-5.265	0.0044	0.0141
Post_PostAlveolarsTRUE	-35.3	-38.86	-57.15	-19.044	0.0001	0.0005

Table 67: SIQi vs SIQe- F1	Estimate	Std. Error	t value
(Intercept)	480.73	10.341	46.49
Voweli	-26.687	5.492	-4.86
SexM	-96.041	14.683	-6.54
Post_StopsTRUE	-40.133	6.347	-6.32
Post_FricativesTRUE	-15.012	6.472	-2.32
Post_AlveolarsTRUE	-13.507	5.48	-2.46
Post_PostAlveolarsTRUE	-35.301	10.064	-3.51

The F1 frequency in Spanish-derived /i/ was significantly lower than that of Spanish-derived /e/ in IQ morphemes [t=-4.86, p<0.0001, β=-26.6].



6.3.7.2 Spanish-Derived IQ /i/ vs. Spanish-Derived IQ /e/ - F2

This section compares the F2 frequencies of IQ Spanish-derived /i/s like those found in the word [amigumi] 'friend+VAL' (from Spanish *amigo* 'friend'), with IQ Spanish-derived /e/s similar to those found in the word [kuadernuta] 'notebook+ACC' (from Spanish *cuaderno* 'notebook').

Table 68: SIQi vs SIQe F2 - Pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	2542.73	2548.7	2451.51	2647.569	0.0001	0
Voweli	126.23	126.74	92.69	162.497	0.0001	0
SexM	-320.6	-316.68	-443.18	-202.127	0.0006	0
Pre_TapTRUE	-204.71	-207.39	-261.32	-149.084	0.0001	0
Pre_LabialsTRUE	-118.7	-110.33	-159.52	-65.395	0.0001	0
Pre_AlveolarsTRUE	-126.34	-123.05	-171.05	-78.934	0.0001	0
Pre_PostalveolarsTRUE	-183.02	-187.97	-322.52	-60.475	0.0042	0.0114
Post_FricativesTRUE	-102.3	-111.61	-152.04	-72.563	0.0001	0
Post_TapTRUE	-204.3	-232.77	-296.15	-170.897	0.0001	0
Post_LabialsTRUE	-151.02	-156.64	-214.4	-98.647	0.0001	0
Post_AlveolarsTRUE	-104.09	-110.29	-155.48	-65.601	0.0001	0
End_of_WordTRUE	-190.72	-204.14	-305.31	-98.547	0.0001	0.0004
PoS_AdjectiveTRUE	97.29	101.57	35.01	173.807	0.0058	0.0135
PoS_VerbTRUE	63.02	61.98	18.53	103.715	0.0052	0.0129

Table 69: SIQi vs SIQe- F2	Estimate	Std. Error	t value
(Intercept)	2542.73	57.52	44.21
Voweli	126.23	19.36	6.52
SexM	-320.6	70.22	-4.57
Pre_TapTRUE	-204.71	29.64	-6.91
Pre_LabialsTRUE	-118.7	25.25	-4.7
Pre_AlveolarsTRUE	-126.34	25.14	-5.03
Pre_PostalveolarsTRUE	-183.02	72.04	-2.54
Post_FricativesTRUE	-102.3	21.88	-4.68
Post_TapTRUE	-204.3	32.89	-6.21
Post_LabialsTRUE	-151.02	31.71	-4.76
Post_AlveolarsTRUE	-104.09	24.77	-4.2
End_of_WordTRUE	-190.72	53.35	-3.57
PoS_AdjectiveTRUE	97.29	39.21	2.48
PoS_VerbTRUE	63.02	25.25	2.5

The F2 frequency in Spanish-derived /i/ was significantly higher than that of Spanish-derived /e/ in IQ morphemes [t=6.52, p<0.0001, β=126.2].

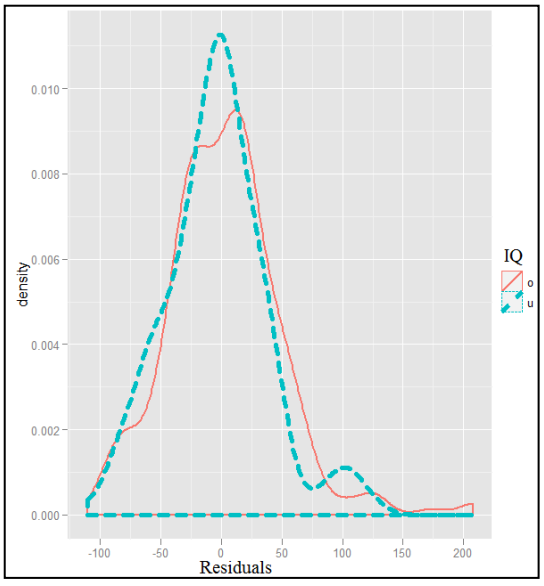
6.3.7.3 Spanish-Derived IQ /u/ vs. Spanish-Derived IQ /o/ - F1

This section compares the F1 frequencies of IQ Spanish-derived /u/s like those found in the word [lunaka] 'moon+TOP' (from Spanish *luna* 'moon'), with IQ Spanish-derived /o/s similar to those found in the word [kuaderṉuta] 'notebook+ACC' (from Spanish *cuaderno* 'notebook').

Table 70: SIQu vs SIQo F1 - Pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	481.02	481.15	456.26	506.98	0.0001	0
Vowelu	-25.15	-25.02	-35.54	-14.22	0.0001	0
SexM	-90.2	-90.5	-130.4	-51.84	0.0004	0
Pre_AlveolarsTRUE	23.92	25.24	14.85	36.14	0.0001	0.0001

Table 71: SIQu vs SIQo- F1	Estimate	Std. Error	t value
(Intercept)	481.024	13.654	35.23
Vowelu	-25.153	5.768	-4.36
SexM	-90.196	20.925	-4.31
Pre_AlveolarsTRUE	23.925	5.845	4.09

The F1 frequency in Spanish-derived /u/ was significantly lower than that of Spanish-derived /o/ in IQ morphemes [t= 4.36, p<0.0001, β=-25.1].



6.3.7.4 Spanish-Derived IQ /u/ vs. Spanish-Derived IQ /o/ - F2

This section compares the F2 frequencies of IQ Spanish-derived /u/s like those found in the word[lunaka] 'moon+TOP' (from Spanish *luna* 'moon'), with IQ Spanish-derived /o/s similar to those found in the word [kuadernuta] 'notebook+ACC' (from Spanish *cuaderno* 'notebook').

Table 72: SIQu vs SIQo F2 - Pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	1199.95	1221.2	1134.49	1307.97	0.0001	0
Vowelu	-61.26	-57.8	-97.17	-16.97	0.0056	0.008
Pre_NasalsTRUE	-199.48	-231.7	-313.49	-150.48	0.0001	0
Pre_StopsTRUE	-173.85	-194.4	-254.21	-135.18	0.0001	0
Pre_FricativesTRUE	-199.22	-214	-283.44	-141.48	0.0001	0
Pre_ApproxTRUE	-343.54	-375.6	-459.63	-285.69	0.0001	0
Pre_AlveolarsTRUE	297.17	290	246.71	334.79	0.0001	0
Pre_PostalveolarsTRUE	198.47	181	102.28	259.56	0.0001	0
Pre_PalatalTRUE	348.61	346.3	169.36	536.58	0.0004	0.0009
Beginning_of_WordTRUE	-179.78	-228.2	-358.71	-96.96	0.0002	0.0118
Post_ApproxTRUE	-115.41	-103.4	-172.12	-37.42	0.0026	0.0033
Post_AlveolarsTRUE	122.25	117.3	76.95	156.04	0.0001	0
Post_VelarsTRUE	-100.55	-106	-161.59	-48.56	0.0001	0.0007

Table 73: SIQu vs SIQo-F2	Estimate	Std. Error	t value
Vowelu	-61.26	22.98	-2.666
Pre_NasalsTRUE	-199.48	46.66	-4.275
Pre_StopsTRUE	-173.85	35.96	-4.834
Pre_FricativesTRUE	-199.22	42.28	-4.711
Pre_ApproxTRUE	-343.54	51.73	-6.641
Pre_AlveolarsTRUE	297.17	25.42	11.688
Pre_PostalveolarsTRUE	198.47	46.66	4.253
Pre_PalatalTRUE	348.61	104.67	3.33
Beginning_of_WordTRUE	-179.78	71.1	-2.529
Post_ApproxTRUE	-115.41	39.1	-2.952
Post_AlveolarsTRUE	122.25	22.68	5.39
Post_VelarsTRUE	-100.55	29.57	-3.401

The F2 frequency for Spanish-derived /u/ was significantly lower than that of Spanish-derived /o/ in IQ morphemes [t=-2.66, p=0.0056, β=-61.2].

6.3.8 IQ Spanish-Derived High Vowels vs. Mid Vowels - Summary

The results of the statistical tests in section 6.3.7 reported significant differences in tongue body height between Spanish-derived high vowels and mid vowels in Imbabura Quichua. The F1 frequency differences are comparable in size to the effects of neighbouring segments and other significant predictors. The F2 frequencies for between Spanish-derived high vowels and mid vowels are significantly different as well. The F2

frequency differences are also comparable in size to the effects of neighbouring segments and other significant predictors.

These effects are not being caused by a handful of clear mid tokens that are dragging the average up and down – rather the entire distribution for /e/ has shifted over relative to /i/. In contrast, a small handful of Spanish-derived /o/ tokens appear to show up as clear /o/ with no appreciable shift in the rest of the distribution. See graph in section 6.3.7.3. This case of hypercorrection by the Quichua speakers could be causing a significant difference wherein there may otherwise be a non-significant result. The F1 frequency differences in IQ indicate a noticeable raise in tongue body height – nearly half the size of those found in PML, i.e., the Spanish mid vowels are higher (Hz) in PML than in IQ.

Table 74 shows the F1 and F2 frequency differences in Hertz between IQ high vowels compared to the model's intercept:

F1	Vowel	Avg. Spanish-Derived High Vowel Frequency[50]	Spanish-Derived Mid Vowel Frequency[50]
IQ	/i/	454.1 Hz	480.7 Hz
IQ	/u/	455.9 Hz	481.0 Hz
F2	Vowel	Avg. Spanish-Derived High Vowel Frequency[50]	Spanish-Derived Mid Vowel Frequency[50]
IQ	/i/	2650.9 Hz	2524.7 Hz
IQ	/u/	1138.64 Hz	1199.9 Hz

Table 74: Significant Hz differences: IQ Spanish-derived high vowels compared to Spanish-derived mid vowels

[50] Based on the coefficient estimates (β) from each model that rendered a significant result.

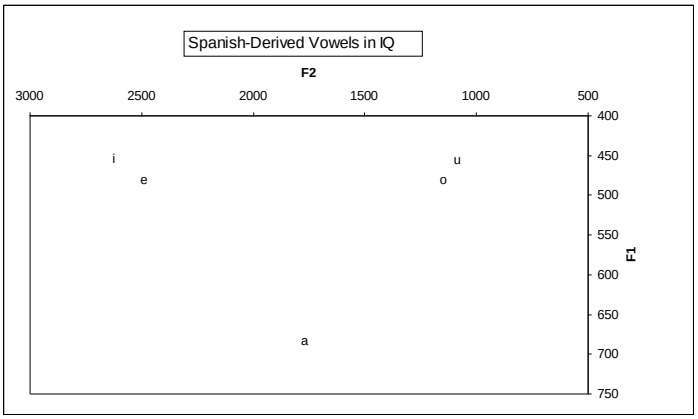


Figure 27: IQ vowel chart of significant F1 and F2 results based on the coefficient estimate difference at the model intercept.

6.3.9 PML: Q-Derived High Vowels vs. SP-Derived Mid Vowels

I have shown that Spanish-derived /i/ and /u/ are significantly higher and fronter than Quechua-derived /i/ and /u/ in PML. I have also shown that Spanish-derived /i/ is significantly higher and fronter than Spanish-derived /e/, while Spanish-derived /u/ is significantly higher than Spanish-derived /o/. But it remains unclear whether PML speakers have merged Quechua-derived /i/ and /u/ with Spanish-derived /e/ and /o/ respectively, the way that Guion (2003) found many early Quichua/Spanish bilinguals did, or whether they also maintain the distinction between those two vowels, the way Guion found many simultaneous Quechua/Spanish bilinguals did. That is, we still need to find out whether the situation is more like the illustration in the left side of figure (28) or more like the right side of figure (28).

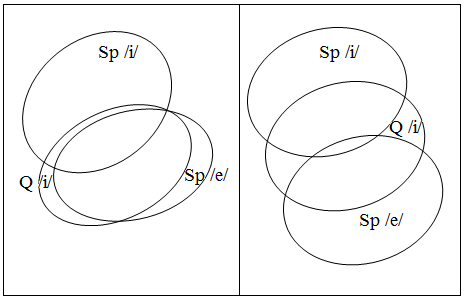


Figure 28: Extreme merger among Quichua-derived /i/ and Spanish-derived /e/ (right), partial merger among Quichua-derived /i/ and Spanish-derived /e/ (left)

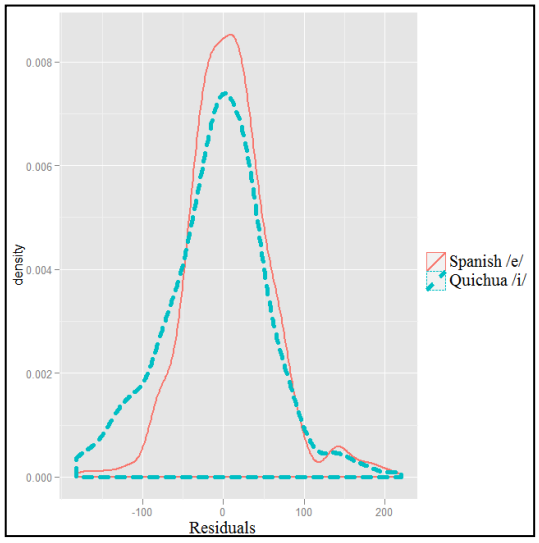
The statistical tests reported in this section were designed to answer the question: is there a statistically significant difference between Quichua-derived high vowels and Spanish-derived mid vowels in Pijal Media Lengua (PML)?

6.3.9.1 PML: Q-derived /i/ vs. Sp-derived /e/ - F1

This section compares the F1 frequencies of PML Quichua-derived /i/s like those found in the word [comingiʧi] 'you eat', with PML Spanish-derived /e/s similar to those found in the word [eskɾibiʧunmi] 'in order to write' (from Spanish *escribir* 'to write').

Table 75: QMLi vs SMLe F1 - pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	467.79	467.62	436.59	500.75	0.0001	0
Voweli	-39.08	-39.24	-50.014	-28.29	0.0001	0
SexM	-120.06	-119.94	-170.297	-70.02	0.0001	0
Pre_NasalsTRUE	40.78	40.69	27.163	54.28	0.0001	0
Pre_VelarsTRUE	-27.68	-27.65	-42.122	-13.71	0.0001	0.0001
Post_NasalsTRUE	18.57	18.66	6.354	31.58	0.0046	0.0036
Post_TapTRUE	31.75	31.86	11.862	50.69	0.0018	0.0013
Post_LowVowelTRUE	62.04	62.18	19.571	106.76	0.0052	0.0046
End_of_WordTRUE	24.63	24.77	11.022	38.38	0.0006	0.0004

Table 76: QMLi vs SMLe F1	Estimate	Std. Error	t value
Intercept)	467.792	18.135	25.795
Voweli	-39.076	5.597	-6.981
SexM	-120.06	28.198	-4.258
Pre_NasalsTRUE	40.78	6.759	6.033
Pre_VelarsTRUE	-27.684	7.136	-3.88
Post_NasalsTRUE	18.568	6.355	2.922
Post_TapTRUE	31.748	9.858	3.22
Post_LowVowelTRUE	62.036	21.829	2.842
End_of_WordTRUE	24.626	6.934	3.551



The F1 frequency in Quichua-derived /i/ was significantly lower than that of Spanish-derived /e/ in PML morphemes [t=-6.9, p<0.0001, β=-39.0].

6.3.9.2 PML: Q-derived /i/ vs. Sp-derived /e/ - F2

This section compares the F2 frequencies of PML Quichua-derived /i/s like those found in the word [comingitʃi] ‘you eat’, with PML Spanish-derived /e/s similar to those found in the word [eskɾibitʃunmi] ‘in order to write’ (from Spanish *escribir* ‘to write’).

Table 77: QMLi vs SMLe F2 - pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	2323.76	2329.82	2276.97	2382.92	0.0001	0
Voweli	139.48	131.86	103.97	161.8	0.0001	0
SexM	-354.69	-357.6	-428.44	-282.12	0.0001	0
Pre_TapTRUE	-197.21	-191.55	-237.26	-145.03	0.0001	0
Pre_LabialsTRUE	-57.71	-79.32	-119.48	-39.47	0.0002	0.0117
Pre_AlveolarsTRUE	-115.8	-115.91	-153.45	-79.97	0.0001	0
Pre_PostalveolarsTRUE	-82.57	-83.38	-134.63	-34.81	0.0014	0.0045
Post_TapTRUE	-59.65	-49.18	-99.71	3.86	0.0634	0.0308
Syllable_AntepenultimateTRUE	44.93	46.51	17.54	78.14	0.005	0.0042

Table 78: QMLi vs SMLe F2	Estimate	Std. Error	t value
(Intercept)	2323.76	26.82	86.63
Voweli	139.48	17.49	7.98
SexM	-354.69	32.49	-10.92
Pre_TapTRUE	-197.21	26.57	-7.42
Pre_LabialsTRUE	-57.71	22.83	-2.53
Pre_AlveolarsTRUE	-115.8	21.29	-5.44
Pre_PostalveolarsTRUE	-82.57	28.98	-2.85
Post_TapTRUE	-59.65	27.55	-2.16
Syllable_AntepenultimateTRUE	44.93	15.64	2.87

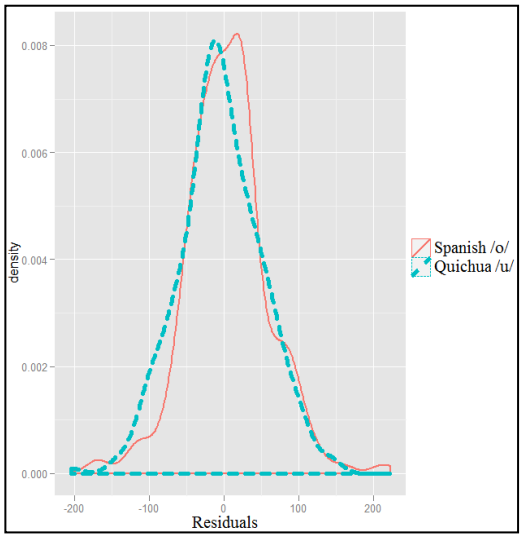
The F2 frequency in Quichua-derived /i/ was significantly higher than that of Spanish-derived /e/ in PML morphemes [$t=7.9$, $p<0.0001$, $\beta=139.4$].

6.3.9.3 PML: Q-derived /u/ vs. Sp-derived /o/ - F1

This section compares the F1 frequencies of PML Quichua-derived /u/s like those found in the word [kasakuna] ‘houses’, with PML Spanish-derived /o/s similar to those found in the word [karomi] ‘car+VAL’ (from Spanish *carro* ‘car/bus’).

Table 79: QMLu vs SMLo F1 - pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	517.15	516.64	480.563	550.764	0.0001	0
Vowelu	-22.53	-23.49	-33.861	-13.417	0.0001	0
SexM	-110.5	-109.81	-165.775	-54.753	0.0008	0.0027
Pre_ApproxTRUE	30.44	30.61	8.952	51.402	0.0062	0.0057
Pre_PostalveolarsTRUE	-27.56	-27.15	-46.859	-8.914	0.0052	0.004
Pre_PalatalTRUE	-62.9	-62.4	-86.328	-38.884	0.0001	0
Pre_HighFrontVowelsTRUE	-105.58	-103.34	-182.612	-19.023	0.0118	0.011
Post_LowVowelTRUE	72.87	73.72	21.023	124.641	0.006	0.0057

Table 80: QMLu vs SMLo F1	Estimate	Std. Error	t value
(Intercept)	517.149	23.39	22.11
Vowelu	-22.528	4.86	-4.635
SexM	-110.501	36.74	-3.008
Pre_ApproxTRUE	30.438	10.97	2.775
Pre_PostalveolarsTRUE	-27.564	9.553	-2.885
Pre_PalatalTRUE	-62.901	11.979	-5.251
Pre_HighFrontVowelsTRUE	-105.583	41.4	-2.55
Post_LowVowelTRUE	72.868	26.253	2.776



The F1 frequency in Quichua-derived /u/ was significantly lower than that of Spanish-derived /o/ in PML morphemes [t=-4.6, p<0.0001, β=-22.5].

6.3.9.4 PML: Q-derived /u/ vs. Sp-derived /o/ - F2

This section compares the F2 frequencies of PML Quichua-derived /u/s like those found in the word [kasakuna] 'houses', with PML Spanish-derived /o/s similar to those found in the word [karomi] 'car+VAL' (from Spanish *carro* 'car/bus').

Table 81: QMLu vs SMLo F2 - pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	1105.16	1103.49	1024.267	1184.13	0.0001	0
Vowelu	-30.12	-21.95	-57.183	13.15	0.213	0.1228
SexM	-142.23	-143.61	-258.069	-22.34	0.019	0.0136
Pre_TapTRUE	170.28	170.41	102.688	239.91	0.0001	0
Pre_ApproxTRUE	-74.32	-78.58	-149.511	-9.17	0.0284	0.0445
Pre_AlveolarsTRUE	228.27	227.19	187.78	267.23	0.0001	0
Pre_PostalveolarsTRUE	289.45	284.32	222.076	347.33	0.0001	0
Pre_PalatalTRUE	315.38	321.97	239.301	399.22	0.0001	0
Pre_LowVowelTRUE	395.04	396.26	63.821	756.69	0.0256	0.0194
Post_TapTRUE	161.01	154.08	99.572	213.41	0.0001	0
Post_AlveolarsTRUE	97.34	100.73	66.435	135.82	0.0001	0
Post_PostAlveolarsTRUE	161.52	144.42	78.542	211.97	0.0001	0
Syllable_PenultimateTRUE	32.59	36.42	7.087	67.63	0.016	0.0364

Table 82: QMLu vs SMLo F2	Estimate	Std. Error	t value
(Intercept)	1105.16	40.16	27.519
Vowelu	-30.12	19.49	-1.545
SexM	-142.23	57.49	-2.474
Pre_TapTRUE	170.28	36.19	4.706
Pre_ApproxTRUE	-74.32	36.91	-2.013
Pre_AlveolarsTRUE	228.27	21.71	10.514
Pre_PostalveolarsTRUE	289.45	33.88	8.543
Pre_PalatalTRUE	315.38	45.11	6.992
Pre_LowVowelTRUE	395.04	168.48	2.345
Post_TapTRUE	161.01	30.34	5.307
Post_AlveolarsTRUE	97.34	18.57	5.243
Post_PostAlveolarsTRUE	161.52	35.24	4.584
Syllable_PenultimateTRUE	32.59	15.54	2.097

There was a non-significant difference between the F2 frequency for Quichua-derived /u/ and Spanish-derived /o/ in IQ morphemes [t=-1.5, p=0.213, β=-30.1]. Recall there was also a non-significant difference in F2 between Spanish-derived /i/ and Spanish derived /e/.

6.3.10 PML: Q-Derived High vowels vs. SP-Derived Mid Vowels – Summary

The results of the statistical tests in section 6.3.9 reported significant differences in tongue body height (F1) between Quichua-derived high vowels and Spanish-derived mid vowels in Pijal Media Lengua. The F1 frequency differences are slightly smaller than the effects of neighbouring segments and other significant predictors.

As would be expected, the F1 frequency differences between Quichua-derived high vowels and Spanish-derived mid vowels are not as large as those found between Spanish-derived high vowels and Spanish-derived mid vowels in section 6.3.5.

The F2 frequency differences are also slightly smaller than the effects of neighbouring segments and other significant predictors. These results suggest that PML may be manipulating as many as eight vowels.

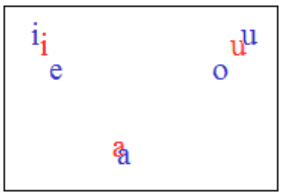


Figure 29: PML vowel system

6.3.11 IQ: Native Quichua High Vowels vs. SP-Derived Mid Vowels

I have shown that Spanish-derived /i/ and /u/ are non-significantly different from Quechua-derived /i/ and /u/ in IQ. I have also shown that Spanish-derived /i/ and /u/ are significantly higher and fronter than Spanish-derived /e/ and /o/ respectively. But it remains unclear whether IQ speakers have merged native Quichua /i/ and /u/ with Spanish-derived /e/ and /o/ respectively, the way that Guion (2003) found many early Quichua/Spanish bilinguals did, or whether they also maintain the distinction between those two vowels, the way Guion found many simultaneous Quechua/Spanish bilinguals did. That is, we still need to find out whether the situation is more like the the right side or left side of the illustration in figure (28).

The statistical tests reported in this section were designed to answer the question: is there a statistically significant difference between native Quichua high vowels and Spanish-derived mid vowels in Imbabura Quichua (IQ)?

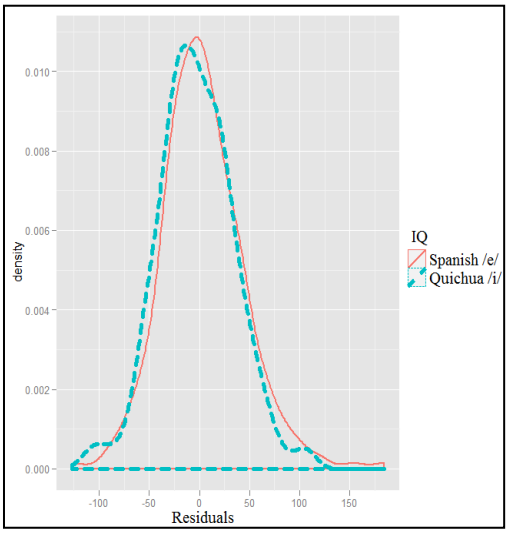
This question is important in order to support the results in section 6.3.3 and 6.3.7 which indicate IQ may be manipulating as many as six vowels. Non-significant results in this section could suggest that IQ is in fact a three vowel system wherein the native Quichua high vowels actually make up a single category including the Spanish-derived mid vowels. Significant results in this section, along with those in section 6.3.3 and 6.3.7 and would suggest IQ may in fact use up to six vowels including a category containing both Spanish-derived high vowels and native Quichua high vowels, a category containing Spanish-derived mid vowels and two overlapping categories containing Spanish-derived low vowels and native Quichua low vowels respectively.

6.3.11.1 IQ: Native Quichua /i/ vs. Sp-derived /e/ - F1

This section compares the F1 frequencies of native Quichua /i/s like those found in the word [ʃimita] 'language+ACC', with IQ Spanish-derived /e/s similar to those found in the word [kuadernuta] 'notebook+ACC' (from Spanish *cuaderno* 'notebook').

Table 83:QIQi vs SIQe F1 - pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	451.97	452.41	432.584	471.856	0.0001	0
Voweli	-28.96	-28.305	-36.02	-20.458	0.0001	0
SexM	-98.5	-98.537	-128.543	-68.409	0.0001	0
Pre_NasalsTRUE	19.99	19.722	8.754	29.844	0.0004	0.0012
Pre_VelarsTRUE	-20.73	-22.454	-33.542	-11.592	0.0002	0.0009
Post_NasalsTRUE	26.1	24.298	14.874	33.655	0.0001	0
Post_TapTRUE	40.79	41.086	30.42	51.407	0.0001	0
Syllable_AntepenultimateTRUE	-10.54	-9.368	-17.863	-1.266	0.0288	0.0153

Table 84:QIQi vs SIQe F1	Estimate	Std. Error	t value
(Intercept)	451.971	10.309	43.84
Voweli	-28.957	4.553	-6.36
SexM	-98.501	15.259	-6.46
Pre_NasalsTRUE	19.985	6.148	3.25
Pre_VelarsTRUE	-20.727	6.225	-3.33
Post_NasalsTRUE	26.098	4.904	5.32
Post_TapTRUE	40.787	5.796	7.04
Syllable_AntepenultimateTRUE	-10.54	4.333	-2.43



The F1 frequency in native Quichua /i/ was significantly lower than that of Spanish-derived /e/ in IQ morphemes [t=-6.3, p<0.0001, β=-28.9].

6.3.11.2 IQ: Native Quichua /i/ vs. Sp-derived /e/ - F2

This section compares the F2 frequencies of native Quichua /i/s like those found in the word [ʃimita] 'language+ACC', with IQ Spanish-derived /e/s similar to those found in the word [kuadernuta] 'notebook+ACC' (from Spanish *cuaderno* 'notebook').

Table 85: QIQi vs SIQe F2 - pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	2581.18	2595.35	2507.353	2685.303	0.0001	0
Voweli	131.69	120.37	85.274	154.777	0.0001	0
SexM	-288.21	-286.61	-397.944	-172.314	0.0004	0
Pre_TapTRUE	-232.85	-233.29	-278.407	-189.907	0.0001	0
Pre_LabialsTRUE	-121.89	-117.5	-156.202	-77.971	0.0001	0
Pre_AlveolarsTRUE	-139.01	-139.98	-174.749	-105.077	0.0001	0
Pre_PostalveolarsTRUE	-119.56	-115.41	-170.408	-63.459	0.0001	0.0001
Post_FricativesTRUE	-129.06	-141.81	-175.204	-106.268	0.0001	0
Post_TapTRUE	-234.25	-252.49	-299.025	-202.755	0.0001	0
Post_LabialsTRUE	-166.33	-168.91	-211.21	-125.552	0.0001	0
Post_AlveolarsTRUE	-91.07	-93.34	-127.03	-57.957	0.0001	0
Post_HighBackVowelsTRUE	-282.19	-285.21	-472.421	-96.244	0.003	0.0024
End_of_WordTRUE	-115.3	-124.62	-175.142	-77.988	0.0001	0
PoS_NounTRUE	-48.06	-47.92	-75.643	-20.778	0.0006	0.0024
Syllable_PenultimateTRUE	30.71	24.38	-2.839	52.187	0.0822	0.0344
Syllable_UltrapreantepenultimateTRUE	-50.52	-48.4	-89.763	-7.221	0.0218	0.0157

Table 86: QIQi vs SIQe F2	Estimate	Std. Error	t value
(Intercept)	2581.18	51.8	49.83
Voweli	131.69	20.13	6.54
SexM	-288.21	64.91	-4.44
Pre_TapTRUE	-232.85	25.7	-9.06
Pre_LabialsTRUE	-121.89	23.26	-5.24
Pre_AlveolarsTRUE	-139.01	20.64	-6.73
Pre_PostalveolarsTRUE	-119.56	30.48	-3.92
Post_FricativesTRUE	-129.06	18.96	-6.81
Post_TapTRUE	-234.25	25.57	-9.16
Post_LabialsTRUE	-166.33	22.84	-7.28
Post_AlveolarsTRUE	-91.07	18.71	-4.87
Post_HighBackVowelsTRUE	-282.19	92.54	-3.05
End_of_WordTRUE	-115.3	26.16	-4.41
PoS_NounTRUE	-48.06	15.76	-3.05
Syllable_PenultimateTRUE	30.71	14.48	2.12
Syllable_UltrapreantepenultimateTRUE	-50.52	20.86	-2.42

The F2 frequency in native Quichua /i/ was significantly higher than that of Spanish-derived /e/ in IQ morphemes [t=6.5, p<0.0001, β=131.69].

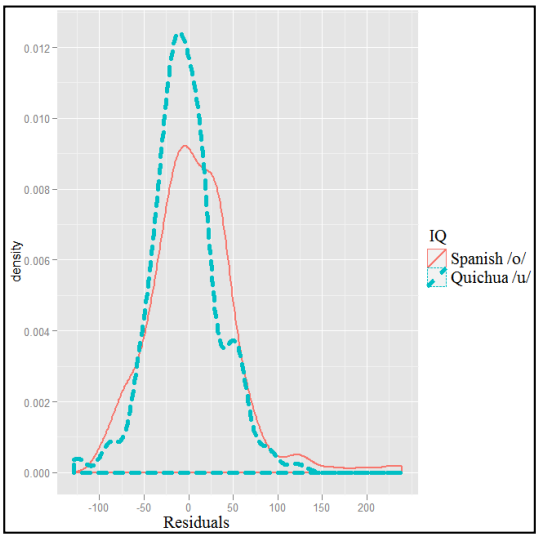
6.3.11.3 IQ: Native Quichua /u/ vs. Sp-derived /o/ - F1

This section compares the F1 frequencies of native Quichua /u/s like those found in the word [ɾu̲ɾanʧi] 'we do', with IQ Spanish-derived /o/s similar to those found in the word [kuaduɐrnu̲ta] 'notebook+ACC' (from Spanish *cuaderno* 'notebook').

Table 87:QIQu vs SIQo F1 - pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	488.52	488.12	463.792	510.998	0.0001	0
Vowelu	-24.36	-24.25	-32.704	-16.196	0.0001	0
SexM	-89.79	-89.49	-125.644	-53.059	0.0001	0
Pre_NasalsTRUE	19.44	20.03	6.925	33.502	0.002	0.0034
Pre_AlveolarsTRUE	17.28	17	7.543	26.814	0.0006	0.0004
Post_PostAlveolarsTRUE	-22.01	-21.73	-35.991	-7.868	0.0032	0.0023
Post_VelarsTRUE	-29.95	-29.7	-40.492	-18.845	0.0001	0

Table 88: QIQu vs SIQo F1	Estimate	Std. Error	t value
(Intercept)	488.516	12.7	38.47
Vowelu	-24.361	4.052	-6.01
SexM	-89.792	19.597	-4.58
Pre_NasalsTRUE	19.443	6.615	2.94
Pre_AlveolarsTRUE	17.276	4.839	3.57
Post_PostAlveolarsTRUE	-22.011	7.175	-3.07
Post_VelarsTRUE	-29.952	5.43	-5.52

The F1 frequency in native Quichua /u/ was significantly lower than that of Spanish-derived /o/ in IQ morphemes [t=-6.0, p<0.0001, β=-24.3].



6.3.11.4 IQ: Native Quichua /u/ vs. Sp-derived /o/ - F2

This section compares the F2 frequencies of native Quichua /u/s like those found in the word [ɾu̲ranʧi] 'we do', with IQ Spanish-derived /o/s similar to those found in the word [kuaduɛrnu̲ta] 'notebook+ACC' (from Spanish *cuaderno* 'notebook').

Table 89: QIQu vs SIQo F2 - pvals.fnc	Estimate	MCMCmean	HPD95lower	HPD95upper	pMCMC	Pr(>|t|)
(Intercept)	1178.15	1171.19	1060.34	1275.79	0.0001	0
Vowelu	-74.73	-65.83	-102.9	-30.45	0.0008	0.0004
SexM	-146.35	-143.51	-264.55	-28.66	0.0248	0.0189
Pre_TapTRUE	149.27	169.14	115.01	222.01	0.0001	0
Pre_AlveolarsTRUE	234.08	234.17	195.24	274.75	0.0001	0
Pre_PostalveolarsTRUE	296.34	302.48	244.19	362.84	0.0001	0
Pre_PalatalTRUE	286.56	286.86	155.38	411.77	0.0001	0
Post_LabialsTRUE	-115.34	-122.72	-164.66	-82.69	0.0001	0
Post_PostAlveolarsTRUE	82.48	86.99	33.6	146.33	0.0026	0.0084
Post_VelarsTRUE	-165.89	-172.65	-215.96	-127.91	0.0001	0
PoS_NounTRUE	-117.78	-111.64	-181.85	-34.25	0.0028	0.0056
PoS_AdjectiveTRUE	-119.8	-130.21	-218.98	-40.95	0.0036	0.0168
PoS_VerbTRUE	-141.78	-143.8	-217.44	-65.81	0.001	0.0015
Syllable_PenultimateTRUE	112.52	109.3	64.89	154.74	0.0001	0
Syllable_AntepenultimateTRUE	142.43	143.54	97.79	191.25	0.0001	0
Syllable_PreantepenultimateTRUE	123.28	115.76	67.76	168.83	0.0001	0
Syllable_UltrapreantepenultimateTRUE	99.81	96.55	24.84	165.71	0.0082	0.0076

Table 90: QIQu vs SIQo F2	Estimate	Std. Error	t value
(Intercept)	1178.15	59.89	19.671
Vowelu	-74.73	21.02	-3.555
SexM	-146.35	62.16	-2.354
Pre_TapTRUE	149.27	32.86	4.542
Pre_AlveolarsTRUE	234.08	22.35	10.475
Pre_PostalveolarsTRUE	296.34	34.37	8.621
Pre_PalatalTRUE	286.56	69.85	4.102
Post_LabialsTRUE	-115.34	21.94	-5.256
Post_PostAlveolarsTRUE	82.48	31.17	2.646
Post_VelarsTRUE	-165.89	23.26	-7.133
PoS_NounTRUE	-117.78	42.34	-2.782
PoS_AdjectiveTRUE	-119.8	49.98	-2.397
PoS_VerbTRUE	-141.78	44.47	-3.188
Syllable_PenultimateTRUE	112.52	23.56	4.777
Syllable_AntepenultimateTRUE	142.43	24.85	5.732
Syllable_PreantepenultimateTRUE	123.28	26.48	4.656
Syllable_UltrapreantepenultimateTRUE	99.81	37.25	2.679

The F2 frequency in native Quichua /u/ was significantly lower than that of Spanish-derived /o/ in PML morphemes [t=-3.5, p=0.0008, β=–74.7].

6.3.12 IQ: Native Q High Vowels vs. SP-Derived Mid Vowels - Summary

The results of the statistical tests in section 6.3.11.X reported significant differences in tongue body height (F1) between native Quichua high vowels and Spanish-derived mid vowels in Imbabura Quichua. The F1 frequency differences are slightly smaller than the effects of neighbouring segments and other significant predictors. Similar to the Spanish-derived high vowel and mid vowel tests, all F2 frequencies were significantly different between the Quichua-derived high vowels and Spanish-derived mid vowels. These results suggest IQ is in fact a 6 vowel system.

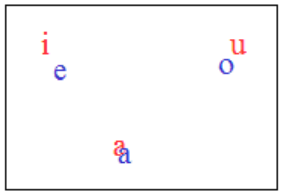


Figure 30: IQ vowel system

7 Discussion and Conclusions

This thesis had the following goals: in section 2, I provided background and historical information on PML's source languages establishing the long history of contact and influence between Quichua and Spanish in Ecuador. Here I included information pertaining to the Quechuan language family and its arrival to Ecuador, demographics of Ecuadorian Quichua, and the influences Spanish and Quichua have had on each other. In section 3, I provided background information on the community of Pijal along with statements from community members and people living near Pijal regarding the current langauge attitude before leading into the grammatical description of PML in section 4. In section 4, I provided a brief grammatical description of PML where I compared it to other documented varieties of Media Lengua, namely, Salcedo Media Lengua (Muysken 1997) and Angla Media Lengua (Gómez-Rendón 2005). I believe these inisghts will help contribute to the study of Media Lengua varieties and potentially the history of Media Lengua and mixed languages in general. In Section 5, I presented the phonemic inventory of PML providing several deviations and adaptations from its source languages. In section six, I presented a comparative analysis of formant one (F1) and formant two (F2) frequencies from both PML and Imbabura Quichua (IQ). I provided acoustic evidence using statistical analysis for as many as eight vowels in PML and up to six vowels in IQ. This evidence shows the possibility of a fourth and fifth vowel, /e/ and /o/ respectively, in both PML and IQ in what are both traditionally considered three vowel systems (Muysken 1997:336, Guion 2003:104). In addition, I provided evidence for the possibility of three more vowels in PML, a Spanish-derived /i/, /u/, and /a/ subset which co-exist as extreme mergers along with the Quichua-derived /i/, /u/, and /a/ subset.

Similarly, I provide evidence for one more possible vowel subset in IQ, Spanish-derived /a/ which co-exists as an extreme merger along with Quichua-derived /a/.

For a myriad of reasons, Pijal Media Lengua (PML) represents an important addition to the literature on mixed languages. After numerous trips to the providence of Cotopaxi, I did not meet any speakers of Salcedo Media Lengua (SML) (Muysken, 1980). This raises doubt about whether it is still spoken in the area. If not, Pijal and its satellite communities may be the only places where Media Lengua is found.

PML bears a striking resemblance to SML (as demonstrates in sections 4.4- 4.7), which could mean that it was either brought to Pijal from Salcedo, or vice versa. This could potentially yield data on the evolutionary paths of two isolated varieties of the same mixed language. Examples like those in section 4.10 could also demonstrate the degree to which the Quichua varieties of the region have influenced each variety of ML. At the same time, examples in sections 4.8 and 4.9 would show innovations not found in SML. Examples like those in sections 4.11 and 4.15 would also provide evidence for a greater amount of Spanish influence though syntactical borrowings or code-switching phrases not found in SML.

Based on the evidence presented in sections 4.4 - 4.7, I do not believe PML and SML have separate geneses. If this turns out to be true, it would fundamentally contradict either Muysken's (1980) or Gómez-Rendón's (2005)[51] versions ML's origins. Nor do I believe, as suggested by Dikker (2008), that ML ever served as a link between older generation Quichua monolinguals and younger generation Spanish monolinguals. The

[51] Since Gómez-Rendón's Media Lengua (AML) was borrowed from Pijal, and he presents AML's genesis and thus PMLs genesis, based on criteria local to the region.

amount of effort required for a Spanish monolingual to learn ML and a Quichua monolingual to learn ML is substantial. It is not an efficient process, especially for the elders who must adapt a completely new vocabulary. These types of situations usually evolve into pidgins and creoles and as demonstrated in section one, ML does not have the characteristics of a trade language or a lingua franca. Furthermore, a Spanish monolingual has to have insights into to the complexities of Quichua semantics in order to correctly use ML's relexified vocabulary, which means they would have to acquire or already have to have a thorough knowledge of Quichua.

Finally, of the 23-27 documented mixed languages, Salcedo Media Lengua is one of the most exemplary examples of a conventionalized intertwined mixed language. The division between lexicon and grammar is so great that theories of mixed language formation, such as matrix language turnover (Myers-Scotton 1998), cannot cope with SML, as it lacks syntactical influences from Spanish. Others such as Bakus (2003, as cited in McConvell and Meakins 2005:12) consider ML the model of mixed languages. Maybe PML code-switching examples from comparatives and superlatives (section 4.11), temporal expressions (section 4.15) and other examples (like (59)) would allow Myers-Scotton to rethink her position on ML as a mixed language.

7.1 Vowel Comparisons

Very little acoustic or psycholinguistic work has been conducted in the field of mixed languages. However, mixed languages hold a wealth of information which could be used to better understand the psychological and neurological factors that allow humans to take two typologically unrelated, fully functional languages split them apart and create

a new, fully functional language based on different linguistic components and with little blending from each source language. The vowel systems of PML and IQ are prime examples of the complexity of vowel systems that would not have been found without such tools.

7.1.1 High- and Low Vowels: IQ and PML

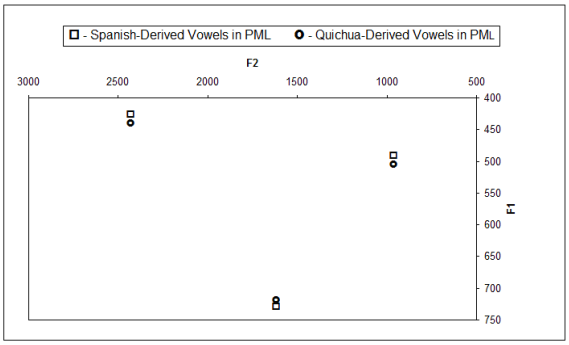


Figure 31: PML vowel chart of significant F1 and F2 results based on the coefficient estimate difference at the model intercept.[52]

The results of this acoustic analysis show that Pijal Media Lengua uses two overlapping vowel systems based on the vowel's language of origin. Spanish-derived high vowels (/i/ and /u/) have lower F1 frequencies while the Spanish-derived low vowel (/a/) has a higher F1 frequency when compared with those of Quichua. The theory of Adaptive Dispersion predicts this type of increased vowel space, showing that five vowel systems like Spanish tend to expand the range of acoustic space to a greater degree than three vowel systems, like Quichua (Livijn 2000:1). The problem with Adaptive Dispersion theory is that while, the vowels are being dispersed in the correct direction, they are not by any means creating separate categories, i.e., they seem to co-exist stably while overlapping each other in an almost identical vowel space. The PML data also contradicts Flege's (2007) Speech Learning Model (SLM) since the SLM suggests that

[52] No significant F2 results were present in Sp-derived vowel and Q-derived vowel comparisons.

two competing systems with stable overlap should be undesirable. The PML data, however, fits (hypothetically) with Best's Perceptual Assimilation Model (PAM) which predicts that bilinguals assimilate L2 sounds based on how similar or contrastive a given sound is perceived by subject's native phonotactics. Within this system categories are allowed to (1) merge into a single category, (2) stay independent, or (3) may co-exist with varying degrees of overlap. The only issue facing this model is the fact that we are not dealing with L2 sounds and that these co-existing systems appear to have been passed down from generation to generation under conditions of extreme merger.

The significant differences are not large (13 Hz lower for SP /i/; 15 Hz lower for SP /u/; 11 Hz higher for SP /a/). These frequency differences are, however, on the border of what can be perceived. These effects are not being caused by a handful of clear tokens that are dragging up and down the average – rather the entire distribution of Spanish-derived vowels has almost completely overlapped the distributions of the Quichua-derived vowels.

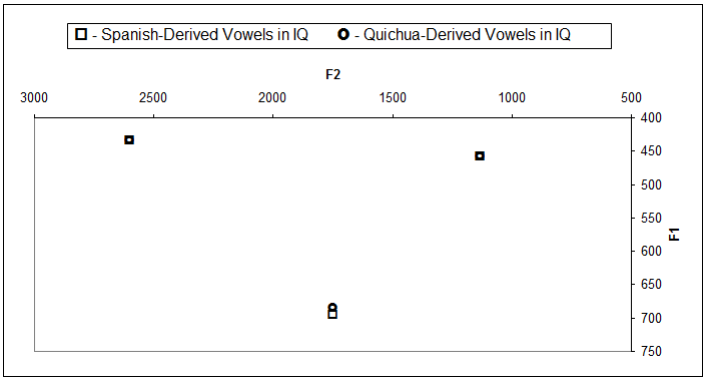


Figure 32: IQ vowel chart of significant F1 and F2 results based on the coefficient estimate difference at the model intercept.[53]

There was a non-significant difference in acoustic vowel space based on the language of origin for Imbabura Quichua high vowels and low vowels (with the

[53] No significant F2 results were present in Sp-derived vowel and Q-derived vowel comparisons.

questionable exception of the F1 frequency in Spanish-derived /a/, as discussed in section 6.3.3.5). If Quichua merges Spanish borrowings according to Quichua phonetics, why was this process only partial in PML? The answer lies in the distinctive evolutionary paths of IQ and PML. In IQ, the main influence of Spanish phonetics on each lexeme would, hypothetically, have been at its point of borrowing, from a small number of bilinguals before immediately conforming to Quichua phonetics when monolinguals adopted the lexemes. The idea of conforming to Quichua phonetics also implies that Spanish-derived vowels underwent 'complete merger' (see figure (35) and consecutive generations would have no point of reference to separate the Spanish-derived and Quichua-derived vowels into distinct categories. For PML, the influence of Spanish phonetics would have come from a large number of bilinguals and lasted for generations.

7.1.1.1 High and Low Vowels: Overview

The complete phonological merger of IQ Spanish-derived high vowels with their native Quichua counterparts is similar to what Guion (2003:116) found for late bilinguals who speak Spanish without producing significantly different Spanish high vowels from those of Quichua.

Within Guion's (2002:116) data there is an untested similarity to my PML data, specifically in her findings on simultaneous bilinguals that maintain separate vowel systems for Quichua and Spanish use. Her data contains the mean results for simultaneous bilinguals (SB) –comparable to Spanish-like vowel production– and the results for late bilinguals (LB) –comparable to Quichua-like vowel production. This data

is analogous to PML speakers who use separate systems for Spanish-derived vowels and Quichua-derived vowels. After converting her data from Bark to Hertz,[54]

$$Hz = \frac{z(1+1960)+0.53}{26.81}$$

Where z = value in Bark

the normalized F1 frequencies of SBs compared to LB showed a mean difference of -32.2 Hz of separation between the Spanish-like /i/ of SBs and Quichua-like /i/ of LBs (see table 75).[55] Guion (2003) did not test these data for significance, however, there appears to be a considerable amount of difference between SBs and LBs. The lower Hertz range for SBs is roughly half as large as that found in the significantly lower Hertz range (-13.0 Hz) between Spanish-derived and Quichua-derived high front vowels in Pijal Media Lengua. This means speakers of PML are maintaining distinct high front vowel categories at half the range of SBs and LBs.

Group	/i/ Mean	Mean Difference Compared to Monolinguals	Mean Difference Compared to Simultaneous
3 vowel (simultaneous)	232.6 Hz	-15.3 Hz *	-
2 vowel (early bilinguals)	231.8 Hz	-16.1 Hz *	-0.8 HZ[?]
1 vowel (late bilinguals)	264.8 Hz	16.9 Hz	32.2 HZ[?]
Monolingual Spanish	247.9 Hz	-	15.3 HZ[?]

*=No significant difference compared to the monolingual group [?]=Not tested

Table 91: Guion's (2003:116) data reproduced in Hertz

The same tendency also takes place with high back vowels. The normalized F1 frequencies from Guion (2003:117) of SBs compared to LBs showed a mean difference of -31.4 Hz of separation between the Spanish-like /u/ of SBs and Quichua-like /u/ of LBs (see table 76). Again this data was not tested for significance but appears to be a

[54] Guion (2003:107) data was also normalized-to-male based on F3 values to avoid between-talker variation. My conversions are based on the normalized data. It is also worth noting that my F1 data (>400) typically come from the intercept for women.

[55] This data was not tested for significance and is just being used a comparable data for the significant findings of the same nature in IQ.

considerable amount difference between SBs and LBs. The lower Hertz range for SBs is nearly half as large as that found in the significantly lower Hertz range (-14.9 Hz) between Spanish-derived and Quichua-derived high back vowels in Pijal Media Lengua. This means speakers of PML are maintaining distinct high back vowel categories at half the range of SBs and LBs.

Group	/u/ Mean	Mean Difference Compared to Simultaneous Bilinguals	Mean Difference Compared to Simultaneous
Separate Spanish /u/	302.8 Hz	20.5 Hz*	-
Separate Spanish /o/	280.1 Hz	-2.2 Hz*	-22.7 HZ[?]
1-Vowel (late bilinguals)	334.2 Hz	51.9 Hz	31.4 HZ[?]
Monolingual Spanish	282.3 Hz	-	-20.5 HZ[?]

*=No significant difference compared to the monolingual group [?]=Not tested

Table 92: Guion's (2003:117) data reproduced in Hertz

Once more this tendency is apparent for low vowels. The normalized F1 frequencies from Guion (2003:117) of SBs compared to LBs showed a mean difference of 15.4 Hz of separation between the Spanish like /a/ of SBs and Quichua like /a/ of LBs (see table 77). Once more this data was not tested for significance; however, the data is comparable to the low vowel dispersion seen in PML Spanish-derived /a/ and Quichua-derived /a/. The higher Hertz range for SBs is only 1/3 as large as that found in the significantly higher Hertz range (10.9 Hz) between Spanish-derived and Quichua-derived low vowels in Pijal Media Lengua. This means speakers of PML are maintaining distinct low vowel categories at 1/3 the range of SBs and LBs. This data is also comparable to the significant difference between Spanish-derived low vowels in IQ and native IQ low vowels. Spanish-derived low vowels in IQ are produced 11.2 Hz higher than their native IQ counterparts.

Group	/a/ mean	Mean Difference Compared to Simultaneous Bilinguals	Mean Difference Compared to Simultaneous
3 Vowel	482.0 Hz	-34.4 Hz	0
Raised Quichua Vowel	469.6 Hz	-46.8 Hz	-12.4 HZ[?]
No Spanish Vowel (late bilinguals)	497.4 Hz	-19 Hz	15.4 HZ[?]
Monolingual	516.4 Hz	-	34.4 HZ[?]

*=No significant difference compared to the monolingual group [?]=Not tested

Table 93: Guion's (2003:118) data reproduced in Hertz

7.1.2 Mid vowels: IQ and PML

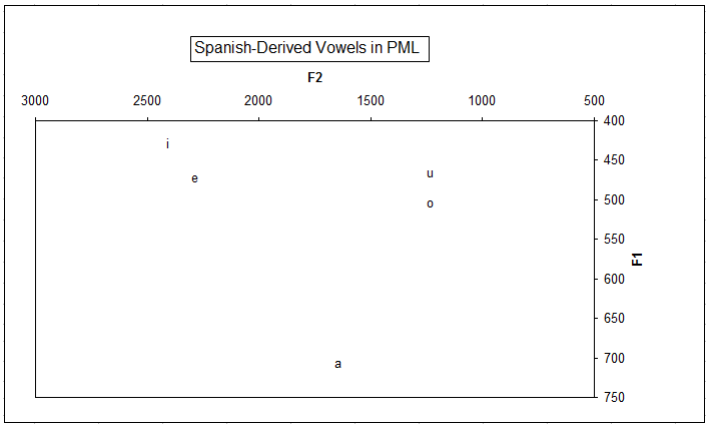


Figure 33: PML vowel chart of significant F1 and F2 results based on the coefficient estimate difference at the model intercept: /i/&/e/ and /u/&/o/.

The results of the acoustic analyses in section 6.3.1 (see 7.1.1.1 for an overview) combined with the results from sections 6.3.5 and 6.3.9 indicate that Pijal Media Lengua may be manipulating as many as eight vowels wherein extreme overlap among Spanish-derived and Quichua-derived high and low vowels appears as well as partial overlap among Spanish derived high and mid vowels. Spanish-derived high vowels (/i/ and /u/) have significantly lower F1 frequencies when compared with Spanish-derived mid vowels (/e/ and /o/). Moreover, Spanish /i/ has a significantly higher F2 frequency when compared with Spanish-derived mid vowel /e/. The addition of /e/ and /o/ are both consistent with Spanish vowel assimilation, as well as the theory of Adaptive Dispersion, which again states that when vowels are added to a three vowel system containing /i/, /u/ and /a/, they tend to appear as /e/ and /o/ (Johnson 2000:1).

Unlike the PML Spanish-derived and Quichua-derived high and low vowels, the significant differences between Spanish-derived high- and mid vowels are more apparent: the F1 frequency for /i/ is 43.7 Hz lower than that of /e/; the F2 frequency for /i/ is 111.8 Hz higher than that of /e/; the F1 frequency for /u/ is 37.6 Hz lower than that of /o/. There was a non-significant difference found for F2 values between /u/ and /o/.

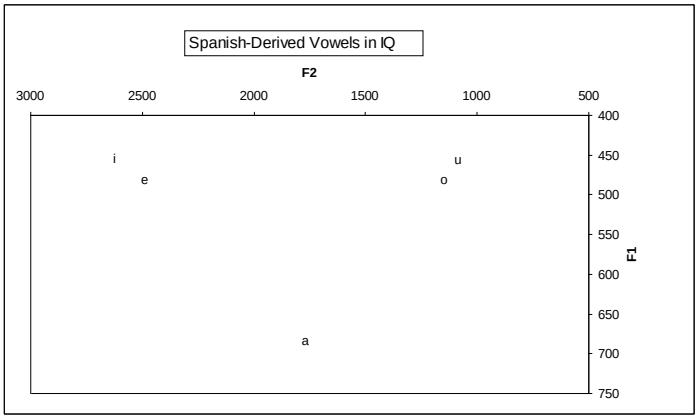


Figure 34: SP-Derived Vowels in IQ Based on the Intercept difference between /i/&/e/ and /u/&/o/.

The results from sections 6.3.3.X combined with the results from sections 6.3.7.X and 6.3.11.X indicate that Imbabura Quichua may manipulate as many as six vowels[56] containing extreme overlap among Spanish-derived and Quichua-derived low vowels and considerable overlap among Spanish derived high- and mid vowels. Spanish-derived high vowels have significantly lower F1 frequencies when compared with Spanish-derived mid vowels. Moreover, Spanish /i/ and /u/ have significantly higher F2 frequencies when compared with Spanish-derived mid vowels.

The significant differences in F1 frequency between Spanish-derived high- and mid vowels are roughly half the size in IQ when compared with PML: the F1 frequency for /i/ is 26.6 Hz lower than that of /e/; the F2 frequency for /i/ is 126.2 Hz higher than

[56] Or more likely, up to five vowels if the significant difference between Spanish-derived and Quichua-derived /a/ turns out to be overturned in future experiments.

that of /e/; the F1 frequency for /u/ is 25.1 Hz lower than that of /o/ and the F2 frequency for /u/ is 61.6 Hz lower than that of /o/.

7.1.2.1 High and Mid Vowels: Overview

Guion's (2002:116) findings for high vowel vs. mid vowel production in late bilinguals (LB) also have certain untested similarities to my IQ data. After converting her data from Bark to Hertz using the same equation from section 7.1.1.1, it appears that LBs –who are comparable to Quichua monolinguals – have a mean F1 difference of 22.6 Hz between the mean frequencies of /i/ and /e/ (/i/ being lower than /e/) and a mean difference of 26.4 Hz between /u/ and /o/ (/u/ being lower than /o/) (see chart 78).[57] These results are virtually identical to the significant differences found between the IQ Spanish-derived high vowels and mid vowels. The IQ results show Spanish-derived /i/ to be 26.6 Hz lower than that of /e/ and Spanish-derived /u/ to be 25.1 Hz lower than /o/. This means speakers of IQ are maintaining distinct high vowel and mid vowel categories at the same mean distance that Guion's late bilinguals are producing Spanish high vowels and mid vowels.

PML speakers show the same results between high vowel and mid vowel production but at roughly twice the distance as those of IQ speakers. This means speakers of PML are performing the impressive task of maintaining distinct high vowel and mid vowel categories at greater acoustic differences than monolinguals, but also at roughly half the distance as simultaneous bilinguals. As with the high vowel and low vowel results, this data shows that the current generation of PML speakers have managed to reconstruct a highly overlapping system of categories using only L1 input. This is evident

[57] This data was not tested for significance and is just being used as comparable data for the significant findings of the same nature in IQ.

in the fact that the current generation of PML speakers are considered early bilinguals (EB)[58]. However, their frequency differences are not overshoots like those found in the early bilingual group, but instead are comparable –to a lesser degree– to those of simultaneous bilinguals *without* being simultaneous bilinguals (see chart 78 for Guion's (2003) findings).

Group	**/i/ Mean**	**/e/ Mean**	**Mean Difference**
3 vowel (simultaneous)	232.6 Hz	337.2 Hz	104.6 Hz
2 vowel (late bilinguals)	231.8 Hz	355.5 Hz	123.7 Hz
1 vowel (late bilinguals)	264.8 Hz	287.4 Hz	22.6 Hz
Monolingual Spanish	247.9 Hz	355.5 Hz	107.6 Hz
Group	**/u/ Mean**	**/o/ Mean**	**Mean Difference**
Separate Spanish /u/	302.8 Hz	372.3 Hz	69.5 Hz
Separate Spanish /o/	280.1 Hz	386.2 Hz	106.1 Hz
1-Vowel	334.2 Hz	360.6 Hz	26.4 Hz
Monolingual Spanish	282.3 Hz	394.9 Hz	112.6 Hz

Table 94: Guion's (2003:116-117) Bark data reproduced in Hertz

7.3 Concluding Remarks for Vowel Comparisons

What do these results show about co-existing phonological systems? It would seem that there is weak evidence for distinct vowel systems in moderate contact situations like IQ, moderate evidence in extreme situations like PML, and strong evidence in simultaneous bilinguals like those found in Guion (2003).

From the standpoint of mergers and near-mergers, I consider 'weak evidence' in IQ to be (1) the complete merger (see figure 35) of Spanish-derived high vowels with their Quichua counterparts, (2) the extreme merger (see figure 35) of Spanish-derived low vowels with of a greater-than-chance probability of separation from their native Quichua counterparts (where it is unlikely that perceptual differences exist), and (3) the considerable merger (see figure 35) of Spanish-derived mid vowels with of a greater-

[58] The typical age of Spanish acquisition for PML speakers was 6-7 years of age upon entering school.

than-chance probability of separation from their Spanish-derived high vowel counterparts, where perceptual discrimination may be 'moderate' according to Best et al.'s (2003) Perceptual Assimilation Model. Weak evidence in this sense shows a system which provides evidence for and against separate vowel systems.

I consider 'moderate evidence', like that of PML, to be (1) the extreme mergers of Spanish-derived high- and low vowels with of a greater-than-chance probability of separation from their Quichua-derived counterparts (where it is unlikely that perceptual differences exist), (2) Partial merger (see figure 30) of Spanish-derived mid vowels with of a greater-than-chance probability of separation from their Spanish-derived high vowel counterparts, where perceptual discrimination may be considered moderate to good according to Best et al.'s (2003) Perceptual Assimilation Model. Moderate evidence in this sense shows a system which provides evidence for separate vowel systems with perceptual limitations within certain categories.

I consider 'strong evidence' like that in Guion's (2003) simultaneous bilinguals (SB), to be (1) the considerable overlap of high and low Spanish vowels compared to those of late bilinguals, where perceptual discrimination may be poor to moderate according to Best et al.'s (2003) Perceptual Assimilation Model, (2) the clear distinction between SB's Spanish high vowels with of a greater-than-chance probability of separation from their Spanish mid vowels, where perceptual discrimination may be considered 'excellent' according to Best et al.'s (2003) Perceptual Assimilation Model. Strong evidence in this sense shows a system which provides evidence for separate vowel systems where perceptual boundaries do not limit distinctions among categories.

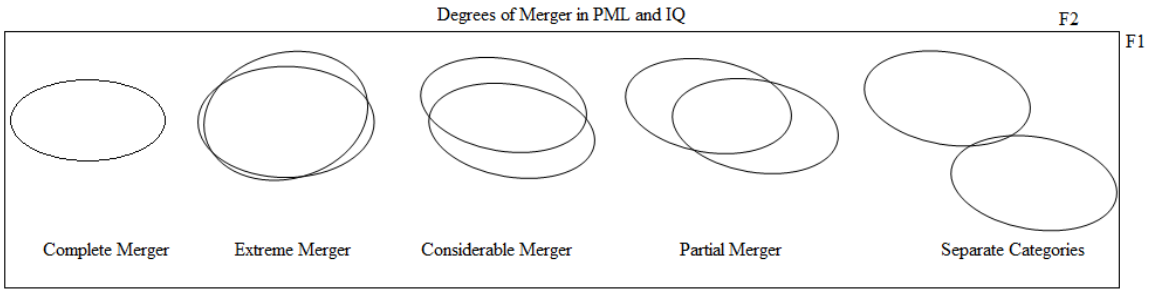


Figure 35: Degrees of Merger in PML and IQ

Do PML speakers have an option for marking words as 'more Spanish' or 'more Quichua', or is language of origin intrinsically marked on lexemes? If PML speakers had the option of marking the language of origin we would expect to find a bimodal distribution where one crest would indicate the Spanish option and the other the Quichua option. Instead we find single shifted distributions like those present in the F1 density charts in section 6. This would suggest no option. Rather, a lexeme's origin is inherently marked, if only slightly. This would indicate the influence of Spanish phonetics that stem from a large number of bilinguals that lasted for several generations before 'freezing' the Spanish-derived phonetic traits, traits that were passed on to successive generations of monolinguals, late bilinguals and eventually early bilinguals.

7.4 Research Opportunities in Pijal

The locals of Pijal are open to and understand the importance of documenting their language. Pijal is easily accessed from the capital of Quito and through their community tourism project. The people of Pijal are gracious and accommodating towards foreigners seeking an extended stay in the community. It is also worth mentioning to future researchers that it is a common trend in Ecuador for Quichua speakers and Spanish speakers alike to call their colloquial dialects *Media Lengua*. We made several long distance bus trips after individuals assured us that yes; they spoke Media Lengua in their

community. Others treated the term *Media Lengua* as a continuum of Spanish borrowings. It was often said "They speak a lot of *Media Lengua* in the next village over" or "We don't speak much *Media Lengua* here". Even Lema (1981) entiled his thesis "*La Media Lengua en la Provincia de Cotopaxi*"[59] and it had nothing to do with actual Media Lengua. The only place where they did not use the term *Media Lengua* was in Pijal, where they called it 'our dialect', 'our Quichua' or *Llanga-shimi* 'nothing language'[60] vs. *Inga-shimi* 'language of the Incas'. When I asked them what they would like me to call their language they were hesitant before calling it *Chapushka-shimi* 'mixed language' and a few visits later they started calling it '*Chaupi-shimi'* literally 'half-language' or *Media Lengua*. So my advice to anyone looking for Media Lengua is not to call it Media Lengua.

[59] Media Lengua in the province of Cotopaxi
[60] This term is typically reserved for older speakers referring to Quichua. However, Pijal it was used to refer to Media Lengua.

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