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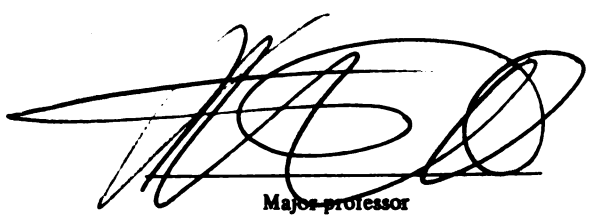

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QUECHUA AND SPANISH LANGUAGE CONTACT: INFLUENCE ON THE QUECHUA PHONOLOGICAL SYSTEM

By

Michael David Pasquale

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ABSTRACT

QUECHUA AND SPANISH LANGUAGE CONTACT: INFLUENCE ON THE QUECHUA PHONOLOGICAL SYSTEM

By

Michael David Pasquale

This dissertation investigates the extent to which there is cross-linguistic influence at the phonetic and phonological levels on a first language (L1) from a second language (L2). Specifically, this dissertation looks at variation in Quechua (L1) as a result of contact with Spanish (L2). It was hypothesized that bilingual speakers with different degrees of proficiency would show differences in what is transferred from the L2 to the L1.

The four following areas were measured in Quechua-Spanish bilingual speakers of Urubamba, Peru: the position of the vowels [ɪ] and [ʊ], the application of the allophonic rule that backs [ɪ] and [ʊ] when in the vicinity of /q/, the voice onset time of plain and aspirated voiceless stops, and the maintenance of the phonemic uvular stop and glottalized voiceless stops /p, t, k, q/.

My results show that at each potential area of influence, there is a difference between the Quechua of bilingual speakers and the Quechua of monolingual speakers. There are also differences between those bilingual speakers who are Quechua-dominant and those who are Spanish-dominant.

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INTRODUCTION

1.0 *Introduction*

This dissertation investigates the extent to which there is cross-linguistic influence (CLI) at the phonetic and phonological levels on a first language from a second language. Specifically, this dissertation looks at variation in Quechua which is a result of contact with Spanish.

First, the nature of vowels in bilingual speakers was investigated in order to see if there has been a change in the Quechua system. The vowel system of monolingual Quechua speakers is comprised of three vowels /ɪ, a, ʊ/, while the Spanish vowel system has five vowels /i, e, a, o, u/. It is hypothized that the difference between the two vowel systems will result in variation within bilingual speakers.

In addition, the voice onset time and other realizations of consonants (e.g. aspirated and glottalized) were measured in order to see if there is a difference in bilingual speakers' Quechua. Aspiration and glottalization are phonemic in Quechua speakers but not in Spanish. Again contact with Spanish may cause variation in the Quechua of bilinguals.

Language contact and bilingualism are settings in which linguistic change in both language systems may be involved, and CLI may occur at any linguistic level. One area of research in sociolinguistics and second language acquisition (SLA)

has been on variation at the phonetic and phonological levels of a language as a result of contact with one another. That research has mainly focused on the influence of one's first language on the pronunciation of a second language. On the other hand, virtually no acoustic analyses have been conducted on the impact of a second language on the first or "reverse transfer" (c.f. Selinker 1969, 1972). The most common elements transferred in such circumstances are lexical items, but structural elements, such as syntactic units and phonological segments, may also be transferred from the L2 to the L1 in an intense language contact situation (Thomason and Kaufman 1988: 37). In such situations it is possible to have the L1 allophones become phonemes as a result of contact with an L2 (Thomason and Kaufman 1988:75). When there is strong cultural pressure, the amount of intensity of the contact situation increases and a loss of phonemic contrasts is also possible (Thomason and Kaufman 1988:75). This cultural pressure refers to the status or power of the L2 in the speech community and the resultant degree of influence it may have on the L1.

The speech community of Urubamba, Peru is the one investigated in this research. Quechua is the first language of a large portion of the population, but Spanish is taught in schools and is used in an official capacity in village government. The result is a continuum of speakers, from those who are monolingual Quechua speakers to those who are monolingual Spanish speakers. In between are those who are bilingual but are stronger in either Quechua or

Spanish. There is no doubt that this is an intense language contact situation and that, at least in educational and official areas, Spanish exerts a great deal of pressure on the basis of its power and prestige.

It was predicted, therefore, that there would be linguistic differences in bilinguals who are dominant in one language over the other. Preliminary research on this subject showed distinct differences at the phonological level between Quechua-dominant speakers and Spanish-dominant ones (Pasquale 2000a, 2000b).

1.1 *Theoretical Background*

1.1.1 *Contrastive Analysis*

When differences in systems arise from contact with one another, there is a need for an approach to explain the ways in which systems can influence one another. From the 1940s to the 1960s, languages were compared to each other using a technique called contrastive analysis (CA). The ease or difficulty in acquiring another language was thought to be directly related to how similar the two languages were. The goal of CA was to predict what difficulties the learner would face in a new language.

Charles Fries (1945:9) explained how CA and language learning were related: "The most efficient materials are those that are based upon a scientific description of the language to be learned, carefully compared with a parallel description of the native language of the learner." Lado (1957:12) describes the three stages of CA:

(1) linguistic analysis of native language (NL) and target language (TL); (2) comparison of these two systems; and (3) the description of 'troublesome contrasts'.

As can be seen in (3) above, the Contrastive Analysis Hypothesis (CAH) attempted to go beyond a general description of differences. The CAH stated that it would be possible to predict difficulties a person with a particular L1 would have in learning a particular L2. This claim is clearly stated by Lado (1957:2): "...those elements that are similar to his native language will be simple for him, and those elements that are different will be difficult."

Before we apply this common-sense approach to the Spanish-influenced Quechua under discussion here, it should be noted that there were problems with the CAH that caused most to abandon the use of CA during the 1970s. In general, the claims made by CAH were hard to prove. The methods of CA were not always able to predict areas of difficulty for language learners. Problems with the CAH included the following (Larsen-Freeman & Long 1991:55-56):

- errors were found to occur in the L2 which were not due to the L1
- errors that were predicted did not occur
- the problem with how to measure "difference" and "distance"
- the CAH was based on the behaviorist model of the 1950s and the fields of psychology and linguistics shifted to the mentalist model

Selinker (1992:2) argues that despite problems with the form of the CAH which attempted to predict all areas of interference, the methodology of CA can still be a useful research tool, and CA methodology will be evident in this study. The

phonological systems of the two languages involved in contact, e.g. Quechua and Spanish, will be described. Areas of difference will be compared, and then hypotheses of possible CLI will be made. This work will focus solely on "reverse transfer," which will see whether the L2 (Spanish) has influenced the L1 (Quechua).

1.1.2 *Language Contact and Bilingualism*

One might argue, however, that the concerns of SLA are strikingly different from the sorts of influences which arise in situations in which languages are in contact. Uriel Weinreich's monograph *Languages in Contact* (1953) was one of the first in depth treatments of language contact and interference. Weinreich defined language contact as a context when two or more languages were alternately used (1953:1). The actual use of two languages by a person was defined as bilingualism and the speaker called a bilingual.

Weinreich also introduced the crucial concept of interlingual identifications, one not at all unlike step 2 of CA above, in which the two language systems are compared and their differences are listed. Then one has 'a list of the potential forms of interference in the given contact situation' (1953:3). The result of finding these potential areas of language transfer by way of interlingual identifications is different from the CAH as proposed by Lado (1957). Weinreich (1953:3) admits that not all potential areas of language transfer will actually occur in a contact

situation, noting (1953:3-4) that other factors, such as the socio-cultural environment, contribute to the degree of variation among bilingual speakers.

1.1.2.1 *Interference*

Weinreich (1953:1) defined interference as the deviation from the norms of either language. In other words, interference is any difference that exists between monolingual and bilingual speakers.

The concept of interference has been revised many times since this early definition from Weinreich. Haugen (1956, 1969) distinguished interference from what he called 'switching' and 'integration'. Both of these terms would fit under Weinreich's 'interference' definition. Haugen defined switching as the alternation between two languages, interference as the overlapping of two languages, and integration as the use of words or phrases that have been historically borrowed but have now become part of the language.

The use of the term 'interference' itself has been challenged. Clyne (1967, 1972) uses the term transference rather than interference because it does not have negative connotations, and recently, the term cross-linguistic influence has been preferred (Sharwood-Smith and Kellerman 1986:1, Romaine 1994:52). This is the term that will be used in this study.

Included within Weinreich's original definition of interference is the practice of using two languages in a conversation. This aspect of bilingual speech has

become a separate area of interest led by the work of Gumperz (1982). The alternate use of two languages in the same conversation has been called code-switching, code-mixing, or language mixing. Gumperz (1982:59) defined code-switching as "the juxtaposition within the same speech exchange of passages of speech belonging to two different grammatical systems or subsystems." Recent work has focused on both syntactic/grammatical issues (c.f. Myers Scotton 1993a, Poplock 1993) and the social motivations for code-switching (Myers Scotton 1993b).

Historically, definitions of "interference" have not clearly excluded code-switching. For example, Mackey (1968) defines interference as "the use of features belonging to one language while speaking or writing another." Clyne (1972) defines transference as "the adoption of any elements or features from the other language." Grosjean (1982:299), however, is more specific in defining interference as "the involuntary influence of one language on the other," and this is the definition of cross-linguistic influence that will be used in this study.

Another distinction in the study of cross-linguistic influence is the direction of that influence, that is, from the native language (L1) or the second language (L2). Weinreich (1953) used 'interference' to refer to both instances (i.e. L1 interfering with L2 and L2 interfering with L1). These can be distinguished by the terms substratum transfer or borrowing transfer respectively (cf. Thomason and Kaufman 1988, Odlin 1989). Substratum transfer can be seen in cases of second language

acquisition where native language patterns are passed to the second, resulting, at the phonological level, in a so-called foreign accent. Borrowing transfer, as noted above, has also been called "reverse transfer" and "backlash interference" (Jakobovits 1970:88), and the most common instance of reverse transfer is the borrowing of words from a L2 into the L1. Weinreich, however, also included the possibility of syntactic and phonological transfer from the L2 into the L1 (Weinreich 1953:1). This work will show that such transfer at the phonological level is indeed possible.

1.1.2.2 *Bilingualism*

1.1.2.2.1 *Degrees of Bilingualism*

A major emphasis in research on bilingualism has been the question of how one determines a bilingual's proficiency in both languages. Degrees of bilingualism range from incipient bilingualism (Diebold 1964) to balanced bilingualism. The term "incipient bilingual," meaning one who is at the earliest stages of bilingualism, has been problematic since there has been no agreement as to how much of a second language one needs to know to really be a bilingual. Haugen (1953:7) argues that a bilingual speaker must be able to "produce meaningful utterances in the [L2]." Romaine (1994:11) suggests that Diebold's definition of incipient bilingualism as the first stage of contact between languages allows the

label "bilingual" to be applied to anyone who uses a word borrowed from another language.

On the other end of the spectrum are those in the category of "balanced bilinguals." Technically a balanced bilingual is one who is equally proficient in two languages in all aspects (such as reading, writing, speaking, and listening) and in all styles of the language (i.e., in having full "communicative competence"). Macnamara (1969:83) allows the term to apply in a more limited sense to one who is proficient in at least one particular area of linguistic competence. Some scholars believe that being a truly balanced bilingual is an ideal but not practically attainable situation (Romaine 1994: 19). Hoffman (1989:75) states "... a bilingual speaker is rarely equally fluent in two languages, because the needs and uses of each are usually quite different."

1.1.2.2.2 *Determining Bilingual Proficiency*

The question as to how to determine the degree of bilingualism of an individual has been the subject of considerable debate over the past forty years. Early work on determining language proficiency focused on directly testing a bilingual speaker in both languages. The results of these tests would then be compared to those of monolingual speakers of each language.

Mackey (1968:557) proposed looking at bilingualism as a series of continua, each of which may vary for an individual speaker. Proficiency would be

determined by a speaker's skills in listening, writing, reading, and speaking in both languages. Each skill would also be compared with the proficiency at each linguistic level such as: (a) phonological / grammatical, (b) lexical, (c) semantic, (d) stylistic, and (e) graphic. Mackey argued that in principle each level is independent from the other; however, in practice there is usually a dependence between levels. Romaine (1994:14) points out that a weakness in Mackey's position is that a person with minimal knowledge in a writing system and no ability to understand what was written could be considered a bilingual.

In the direct method of measuring bilingualism, dominance in one language is determined by subtracting the score of performance in one language from that of the other. The language with the higher score would be the dominant language. If the scores were the same, then there would be a case of "balanced" bilingualism.

On the other hand, Macnamara (1967, 1969) evaluated the different types of tests that indirectly measure bilingualism, such as rating scales, fluency tests, flexibility tests, and dominance tests. Rating scales include various instruments like interviews, language usage scales, and self-rating scales.

A.M. Escobar (1986:151-152) studied advanced bilingualism in Peru and argues that a wide range of criteria should be considered determining language proficiency. She divides these criteria into three groups: (a) type of acquisition, (b) learning environment, and (c) linguistic input. Within these three groups she divides the following criteria: (a) sequence and age of acquisition; (b) origin of

speaker and parent's linguistic ability; and (c) education before exposure to L2, social class and occupation, and the variety of L2 the learner is exposed to.

Hamers and Blanc (2000) also support looking at social as well as linguistic variables to determine bilingual proficiency. They define bilinguality as "the psychological state of an individual who has access to more than one linguistic code as a means of social communication" (Hamers and Blanc 2000:25). Therefore, they reserve the term bilingualism to refer to societal bilingualism, while bilinguality refers to cases of individual bilingualism. They claim that the access that bilinguals have has many sociological as well as psychological dimensions. They list six dimensions that are relevant to bilinguality: (1) relative competence, (2) cognitive organization, (3) age of acquisition, (4) exogeneity, (5) social cultural status, and (6) cultural identity. Exogeneity is the influence of an L2 not ordinarily spoken in the speech community. Place of acquisition is a dimension that is also relevant to language acquisition. The degree of influence from an L2 may be greater in one speech community than in another.

These various approaches have not provided a definitive answer for the present research; therefore, a number of the variables suggested above will be used in this study. See section 3.1.2 for the application of this methodology to the present study.

1.1.3 *Interlanguage*

What is the product of an "influenced" system, whether the first or the second? For SLA Selinker (1972) hypothesized that language learners construct a system comprised of both the native language (NL) and the target language (TL) which he called an interlanguage. This is closely related to the 'idiodyncratic dialect' proposed by Corder (1971) and the 'approximate system' described in Nemser (1971). An interlanguage (IL) can be thought of as:

> ... a continuum between the L1 and L2 along which all learners traverse. At any point along the continuum, the learners' language is systematic, i.e. rule governed, and common to all learners, any difference being explicable by differences in their learning experience. (Larsen-Freeman & Long 1991:61)

Bilingualism in Peru can be explained using the IL hypothesis as a framework. All bilingual speakers can be placed somewhere along a continuum with monolingual speakers of Quechua at one end and monolingual speakers of Spanish at the other. Quechua-dominant bilingual speakers have an interlanguage that falls closer to the monolingual Quechua end, while Spanish-dominant bilingual speakers have an interlanguage closer to that of monolingual Spanish speakers. This study focuses on the shape of the interlanguage of Quechua-dominant and Spanish-dominant speakers but emphasizes the influence that Spanish has had on those systems.

1.1.4 *Focus on Phonetics and Phonology*

1.1.4.1 *Phonemic Analysis*

This dissertation looks at the phonetic and phonological levels in the Quechua of bilingual speakers. This section defines concepts of phonemic analysis as used here in this study.

The phonetic level is concerned with speech production and the description and measurement of sounds in a language. The focus at this level is on the actual sounds of a language, which are called phones. A phone is defined as "a speech event capable of displaying phonetic equivalence between speakers" (Laver 1994:41).

The second level of analysis is the phonological. This level is abstract and considers the contrastive opposition of sounds in a language. The phonological level is systematic and shows what sounds in a language are able to carry distinct meanings. The concept of complementary distribution relates to the fact that some phones never occur in the same phonetic environment in a language. The concepts of phoneme and allophone are important when analyzing the phonological level. Laver (1994:41-42) has the following definition of a phoneme:

> Two speech sounds are said to be manifestations of different phonemes in a given accent of a language when they act as the basis of a contrastive opposition that distinguishes a pair of words of identical phonological structure, differing in the systematic choice made at a single place in that structure. Speech sounds regularly occurring in a number of different structures and contexts may be classified as members of a given phoneme if their occurrences are in complementary distribution, and if they display sufficient phonetic

similarity to make it plausible to class them together as members of a common set.

The members of a phoneme are called allophones. Laver (1994:42) further states that, "it is important to note that the concept of an allophone is itself an abstract concept, and is not to be equated directly with that of a phone, which is a single differentiable phonetic event." It is important to note that a phone of a particular quality may be a member of one phoneme in one language but a member of a different phoneme in another language.

1.1.4.2 *Acoustic-based Interference Studies*

This study looks at phonetic realizations and how language contact influences those realizations. Work in this area has been done by James Flege (c.f. 1980, 1987) whose focus was on adult SLA.

Flege's Speech Learning Model (SLM) concerns the acquisition of a second language and distinguishes among identical, similar, and new sounds in the first and second language. The focus is on the influence of one's first language when acquiring a second language and also on the acoustic-phonetic level, rather than the phonological level. The main concepts in this model are phonetic similarity and equivalence classification.

Phonetic similarity and equivalence classification are used to determine whether a sound in an L2 is identical or similar to a sound in the L1 or is a sound that is not found at all in the L1. Flege (1991:266) describes this process:

> ...an L2 vowel phoneme might be identified as new on the basis of acoustic analysis. New vowels would be those whose realizations occupy a portion of an acoustic phonetic vowel space (e.g. F2 versus F1) that is unoccupied by the realizations of any L1 vowel. Token-to-token variability might be used as a criterion for determining whether a sound in L2 is new or similar. An L2 sound without an equivalent in the L1 might be produced more variably than one judged to have an L1 equivalent. This is because similar sounds tend to be substituted by a single L1 category by even inexperienced L2 learners whereas new sounds may be substituted by a range of variants, at least in the early stages of L2 learning.

New sounds, then, are those that are in one language but not in the other language. For example, English /æ/ is a new sound for native speakers of German. A similar sound in an L2 is defined as one that is close to a sound in the L1, yet is acoustically different (Flege 1988:274). German and English /i, ɪ, ɛ/ are similar sounds. Bohn and Flege (1992:133) state that the difference between the front high vowels /i, ɪ/ in German and English are in terms of spectral quality and duration. In the case of English /ɛ/, the sound is "somewhat lower in the acoustic-phonetic space and longer than German /ɛ/" (Bohn and Flege 1992:133).

Flege (1988: 275), for example, refers back to CA studies (e.g.. Lado 1957) when he states that adult language learners of a second language will substitute a sound from their L1 system when that sound is similar to one that is found in the

L2. Flege (1986) compared the production of new and similar sounds by English speakers who were advanced French learners. The vowel /u/ is a similar sound in both languages. The English speakers pronounced the vowel /u/ significantly different from monolingual French speakers. However, the new French vowel /y/ was produced authentically by the English speakers in French.

Another area of acoustic research by Flege involves the measuring of the voice onset time (VOT) of obstruent consonants. For example, when an obstruent consonant is in syllable initial position before a vowel, the amount of time between the release of the stop and the vibration of the vocal folds in the production of the vowel is measured. The time between the production of the consonant and the vowel is the VOT. VOT values may differ from one language to another. Languages such as Arabic, French, or Spanish have a relatively short delay time, while a language such as English has longer VOT values. Flege (1980) studied the VOT of voiceless aspirated stops [p^h, t^h, k^h] of Arabic speakers who were learning English as a second language. The results were that [p^h, t^h, k^h] of their English speech had shorter VOTs than those produced by native speakers of English. Their first language (L1) influenced their pronunciation of the second language (L2).

In short, Flege (1980) showed that there is transfer in terms of the VOT in speakers that have a short-lag VOT first language and are learning a language that has a long-lag VOT. For example, Flege (1980) revealed that speakers produced

a shorter VOT in English, which has long VOT values, because of influence from Arabic, their L1, which has short VOT values. Spanish has a short-lag VOT (Flege 1991:271) in monolingual speakers. Other studies by Flege and his associates (c.f. Flege, Munro, & MacKay 1996) confirm these results -- that a first language can influence the VOT in a second language if the VOTs are significantly different.

Major (1992) studied the case of reverse transfer and VOT, looking at the influence of a second language, which has a short VOT, on a first language, which has a long VOT. The speakers involved spoke English as a first language, but were learning Brazilian Portuguese as a second language. The results showed that the VOTs of English voiceless obstruents were shorter in Portuguese-English bilingual speakers who had English as their first language than in monolingual English speakers (Major 1992:194-195). These bilingual speakers deviated from the norms established by native speakers of English.

I hypothesize that if Quechua has a long VOT, then there may be influence on Quechua from Spanish resulting in the shortening of the VOT of Quechua voiceless stops of bilingual speakers.

1.1.4.3 *Cross-Linguistic Interference at the Phonetic and Phonological Levels*

The SLM, which is based on the methodology of contrastive analysis (CA), will be a basis for analyzing the phonetics of Quechua. I will identify the sounds

of Quechua and compare them with sounds in Spanish. These identifications will then be applied to an understanding of the Quechua phonological system. My focus will differ from Flege, and from most CA studies, in that I will examine the influence of the interlanguage on the native language of bilingual speakers, i.e. reverse transfer.

1.2 *Hypotheses and Research Goals*

The first area of investigation will be to provide a phonetic description of the Quechua of bilingual speakers and then analyze the phonological system of these speakers. The phonological systems of monolingual Quechua speakers will then be compared to the phonological systems of bilingual Quechua-Spanish speakers to locate areas of transfer. For the purposes of this study, I consider a bilingual to be one who has Quechua as his/her native language and has Spanish as a second language.

These specific questions will be answered in this dissertation:

1a) **What is the position of vowels within the Quechua vowel system and does the position of vowels differ in the system of a bilingual speaker (where Quechua is his/her native language)?**

Suspicion that these positions may be different comes from the fact that the vowel system of a monolingual Quechua speaker is different from the vowel system of a monolingual Spanish speaker. The high vowels in the Spanish system

are relatively higher than the high vowels in Quechua. It was shown in Pasquale (2000a, 2000b) that bilingual speakers have high vowels in Quechua that are relatively higher than the high vowels in monolingual Quechua speakers. These results will be presented here as a background to further analysis.

1b) What are the relations of phonemes and allophones in a Quechua system and is the bilingual system different?

This question will look specifically at the application of the allophonic rule in Quechua which backs and lowers high vowels that are in the vicinity of the uvular consonant /q/.

I will present empirical data that supports this position. I will show that cross-linguistic influence does not only occur to the L2 Spanish phonological system but also to the Quechua L1 system of bilinguals as well.

Although it is hypothesized that the Quechua-dominant bilingual speaker will have relatively separate Spanish and Quechua phonological systems, this is not to say that there will not be any reverse transfer; it is also hypothesized that there will be greater influence from Quechua in the Spanish of Quechua-dominant speakers. Spanish-dominant bilingual speakers will have a combined phonological system that is the result of transfer occurring in both directions, both from the IL to the TL and from the IL to the NL.

(3) **What is the voice onset time (VOT) of voiceless obstruents in Quechua and is the VOT different than in Spanish? If there is a difference in VOT between Quechua and Spanish, does Quechua VOT of bilinguals change?**

Spanish has a short-lag VOT (Flege 1991:271) in monolingual speakers. I hypothesize that if Quechua has a long VOT, then there may be influence on Quechua from Spanish in the resulting in the shortening of the VOT of Quechua voiceless stops of bilingual speakers.

In this present study, it is expected that if Quechua has a long VOT, then bilingual speakers will have a shorter VOT in their Quechua system as a result of contact with Spanish, which has a short VOT. It is predicted that Spanish-dominant bilingual speakers will have a relatively shorter VOT in Quechua than Quechua-dominant bilinguals.

(4) **Do bilingual speakers continue to aspirate and glottalize voiceless affricates and stops in Quechua since Spanish does not have phonemic aspiration or glottalization?**

(5) **Do bilingual speakers continue to pronounce the uvular stop [q] in Quechua? Do the velar and uvular phonemes merge in the bilingual's Quechua system?**

The main issue raised in (4) and (5) is what happens to phonemic contrasts when the languages in contact have different phonemic systems. Aspiration and glottalization are phonemic in Quechua, but do not exist as phonemes in Spanish.

I predict again that levels of bilingual proficiency will be a predictor of the degree of merger. The Spanish-dominant bilingual is predicted to show less aspiration and glottalization. The loss of the uvular stop [q] is also predicted to be more likely in Spanish-dominant bilinguals. Since aspiration and glottalization are phonemic they are more difficult to lose in an L1 (c.f. Thomason and Kaufman 1988:129-130). The same would hold for the presence of the uvular phoneme in the Quechua of bilingual speakers. It is expected that bilingual speakers with different degrees of proficiency will have been influenced by their L2 in different ways and to different degrees.

1.3 *Summary*

By studying the language contact situation between Quechua and Spanish we will be able to see to what extent there is transfer from the L2 of bilingual speakers to their native language (NL), i.e. Quechua. It is expected that bilingual speakers with different degrees of proficiency will correspond to differences in what is transferred from the L2 to the NL.

Chapter 2

LANGUAGE CONTACT AND BILINGUALISM IN PERU

2.0 *General Information*

The language situation in much of South America is a multilingual one with indigenous and European languages in contact. The situation in Peru is no different. Spanish is in contact with languages such as Quechua and Aymara, which are indigenous to the Andes region. During the Inca Empire there were many different languages spoken within the empire, which stretched from Ecuador to Chile, with Quechua emerging as the dominant language. The invasion of the Spanish almost 500 years ago began the situation of long-term contact between Quechua and Spanish which continues to exist today.

2.1 *Bilingualism and Language Attitudes*

2.1.1 *Bilingualism Statistics*

According to a recent census, there are over 15 million people over the age of five in Peru. Of that number 73 percent are monolingual Spanish speakers, 22 percent are Quechua speakers (of whom 35 percent are monolingual), and 2.5 percent are Aymara speakers (of whom 31 percent are monolingual). Speakers of the other indigenous languages and other foreign languages make up the other 2.5 percent of the population of Peru (Instituto Nacional de Estadistica 1999).

There has been an increase in Spanish-Quechua bilingualism in Peru over the last 50 years. Table 2.1 illustrates the shift from monolingual Quechua speakers to bilingual and monolingual Spanish speakers.

TABLE 2.1: Language demographics of Peru 1940-1981 (Gleich & Wölck 1994:27)

	1940	**1961**	**1972**	**1981**
Total population	5.228*	8.235	11.790	18.278
Mono. Spanish (MS)	5.601 (50%)	5.391 (65%)	7.921 (67%)	13.274 (72%)
Que.-Span. Biling (BIL)	817 (16%)	1.393 (17%)	1.715 (15%)	2.979 (16%)
Mono. Quechua (MQ)	1.625 (31%)	1.389 (17%)	1.311 (11%)	2.025 (11%)
Total Quechua (TQ)	47%	34%	26%	27%
Total Spanish (TS)	66%	82%	82%	88%
Total Urban (TU)	35%	47%	60%	65%
Total Rural (TR)	65%	52%	41%	40%

* Population numbers in millions

In Table 2.1 Gleich and Wölck (1994:28) detail these statistics and show that the percentage of monolingual Quechua speakers has dropped from 31% of the population in Peru in 1940 to just 11% of the population in 1981. Secondly, during the same time period, the percentage of monolingual Spanish speakers rose from being half of the population to over two-thirds of the population. Thirdly, the percentage of bilinguals in Peru remained basically the same during the forty-year period, making up about 16% of the population.

2.1.2 *Language Attitude Research*

In Peru all things are not equal as it concerns language. Spanish is considered to be more prestigious than Quechua or any other indigenous language, and

speakers of Spanish are considered to be more educated and to have a higher social status than those who speak other languages (Wölck 1973). This information was found in a survey administered in 1969.

Nine years after Wölck's initial survey of speakers' attitudes in Peru, Gleich and Wölck (1994) restudied the issue. They found that Quechua was viewed more positively than earlier. A person who spoke Quechua was rated as being more attractive, stronger, and smarter than one who only spoke Spanish (36), but Spanish was considered to be the language of institutional values such as education, ambition, and urbanity. Gleich and Wölck (1994:46) state the changes in attitude between 1969 and 1978 as follows:

> The most striking change is the narrowing of the gaps between the evaluations of the two languages and their speakers along almost all dimensions, most notably in the affective values of, e.g. attractiveness, strength, and modesty. In the institutional dimensions there still remains the distinction in favor of Spanish.

De Los Heros (1997) investigated language attitudes in Peru and how they affected language change in non-standard varieties of Spanish in contact with Quechua. She tested whether language attitudes, along with gender and network links, had a significant effect on language variation involving the use of an assibilated [r] and the palatal lateral [λ] in Spanish. An assibilated [r] is pronounced as a fricative. An assibilated [r] after [t], as in *tranvía* 'streetcar,' sounds to those outside the speech community like [č], *chanvía* (Toscano Mateus 1953:97). Historically, /y/ and /λ/ have merged in many varieties of Spanish,

usually leaving /y/. In Andean Spanish, however, those words historically pronounced with [λ] retain that pronunciation. For example *llamo* 'I call' is [λamo] rather than [yamo].

De Los Heros also found that social class was the most important factor for predicting variation in the speech community, although she also found that gender affected variation when combined with other factors, and social network links were the determining factor in the use of non-standard items. Non-standard forms were more frequently found in dense networks. Attitudes did influence [r] and [λ] variation but differently since the assibilated [r] is considered stigmatized in the speech community. The results showed that lower social classes were the most frequent users of the assibilated [r]. The upper middle classes were the most frequent users of the palatal lateral [λ], as opposed to rural speakers who use [y]. The glide [y] is used in the standard variety spoken in Lima, but upper class speakers use [λ] to distinguish themselves from rural speakers, rather than using [y] to associate with the Spanish of Lima (de los Heros 1997: 213). Such results show that attitudes had an effect on language usage.

2.2 *Overview of the Language Systems*

The focus of this work is on Spanish and Quechua phonological systems and their phonetic realizations; therefore, I will not provide a general overview of the Spanish and Quechua morphological and syntactic systems. I will, however,

review some studies that have looked at language contact and borrowing at the morphological and syntactic levels.

2.2.1 *A General Overview of Spanish Phonetics and Phonology*

Spanish has a five vowel system comprised of /i, e, a, o, u/ (Cressey 1978:17). The five phonemes have the following allophones: (1) [i, e, o, u] are slightly lowered in closed syllables, (2) /a/ is palatalized [a̟] when adjacent to a palatal consonant and is velarized when adjacent to /l/ or a velar consonant, e.g. [ma̟yo] 'May' and [ma̠lo] 'bad' respectively (Cressey 1978:21). The five phonemes also have allophones which are shortened in closed, unstressed syllables (Cressey 1978:22).

Previous work in Spanish acoustic phonetics has been done by Quilis (1981), Manrique (1979), and Delattre (1969). Their results confirm a five-vowel system for Spanish with the average formant frequency values for each vowel: /i/: F1 - 300 Hz and F2 - 2300 Hz; /e/: F1- 475 Hz and F2 - 2100 Hz; /a/: F1 - 650 Hz and F2 - 1400 Hz; /o/: F1 - 475 Hz and F2 - 1000 Hz; /u/: F1 - 300 Hz and F2 - 800 Hz. Although formants do not refer literally to tongue positions, the first formant frequency (F1) may be interpreted as vowel height (the lower the frequency the higher the vowel) and the second formant frequency (F2) reflects the relative frontness or backness of the vowel (the higher the frequency, the fronter the vowel).

2.2.2 *The Phonology of Andean Spanish*

The Spanish of Peru is distinct from other varieties of Spanish. The two main regional dialect areas are the Andean highlands, represented by the city of Cusco, and the coastal area, represented by Lima. Lipski (1994:319-321) describes the Andean highland variety of Spanish:

(1) The palatal lateral /λ/ and /y/ are both used in the highlands. The lateral /λ/ is more common in the southern highlands but a merger with /y/ is commonly found in more educated speakers in the cities.

(2) The velarization of /n/, i.e. [ŋ], is found throughout the area.

(3) The affricate /č/ is often pronounced as a fricative, i.e. [š].

(4) At the end of syllables, an /r/ is pronounced as a voiceless sibilant.

(5) A trill is replaced by a fricative /r/ in southern Andean Spanish. The pronunciation is close to that of [ž]. The trilled variety is more common in the north.

(6) In the case of /tr/, /pr/, and /kr/, these are pronounced with a fricative or retroflex approximate /r/ in bilingual speakers. Speakers of other varieties of Spanish pronounce the /r/ as a tap.

(7) The phoneme /s/ is pronounced at the end of words and syllables and not deleted or aspirated as in coastal varieties of Spanish. In addition, in Cusco, the words *once* 'eleven', *doce* 'twelve', and *trece* 'thirteen', are sometimes pronounced with [θ] instead of [s].

(8) The voiced obstruents /b/, /d/, and /g/ are pronounced as stops rather than spirantized in intervocalic environments as in standard Spanish among many speakers, especially Quechua-dominant.

(9) The labial-dental fricative /f/ is often aspirated and pronounced [h] by bilingual speakers. The rounding of [h] also occurs, before both rounded and unrounded vowels, for example, [enh^{w}ermo] *enfermo* 'sick'.

(10) Stress is often shifted to the penultimate syllable in Quechua-dominant speakers. For example, *corazón* 'heart' is pronounced as *corázon.*

(11) Unstressed vowels are regularly reduced in Andean Spanish. "Vowels reduce to the point of elision principally in contact with /s/, in the weakest positions of the metrical structure" (Lipski 1994:320).

(12) The five-vowel system of Spanish tends to be reduced to three vowels in Quechua-dominant speakers. The vowel system of initial bilingual speakers is /ɪ, a, ʊ/ with the merger of [i/e] and [o/u] due to the influence of Quechua.

Lipski's remark concerning the three-vowel Spanish system in Quechua-dominant bilingual speakers concerns the interlanguage phenomena that this study is exploring. The premise of this study is that this vowel reduction is not merely the result of contact with Quechua but is an illustration of an interlanguage in bilingual Quechua-Spanish speakers in Peru.

2.2.3 *An Overview of Quechua Phonetics and Phonology*

Quechua has a three vowel system with / ɪ, a, ʊ / (Canfield 1982:116). Quechua has an allophonic rule that backs the high vowels when they are in the vicinity of a uvular stop [q] (including its glottalized [q'] or aspirated [q^h] variants). The results of this are that /ɪ/ is pronounced as [e] and /ʊ/ as [o] (Parker 1969).

The phrase "in the vicinity" is included in the allophonic rule because it does not apply only when the vowels are adjacent to an uvular consonant but can also apply when separated by another segment such as a nasal, [r] or [s]. Examples from Wölck (1969:9-10) illustrate the rule application across boundaries: [erqe] "small child," [esqon] "nine," [mosoq] "new," and [qanneraq] "someone like you." These examples from Wölck (1969) are from the Cusco Quechua dialect which is the same variety researched here. Other varieties of Quechua do not follow this rule the same way and apply it only when vowels are adjacent to the uvular consonant. This rule does not apply in the Spanish system which has /e/ and /o/ as separate phonemes distinct from /i/ and /u/.

There have been many words borrowed into Quechua from Spanish. The borrowings have mainly been in the areas of religion, clothing, imported animals, and manufactured goods: mankasa "sleeve," wulsiku (from bolsillo) "pocket," waka (from Spanish vaca) "cow" and sijari (from Spanish cigarro) "cigarette" (Hardeman-de-Bautista 1982:147). Some of the borrowed words contain the

sounds [e] and [o] which are similar to the allophones [e] and [o] in Quechua. The main difference is that the [o] in Quechua is backed in comparison to the high vowel /ʊ/ while in Spanish the /o/ is fronted in relation to /u/.

The three Quechua vowels can be characterized with the symbols [ɪ], [a], and [ʊ] based on their acoustic properties. There have been no acoustic studies of Quechua vowels that I am aware of, but the height of vowels has been discussed. Canfield (1982:116) writes "it should be noted that the Quechua vowel system is essentially a three-vowel one: /a, ɪ, ʊ/, the last two similar to those of English *sit* and *book*."

2.3 *Language Contact Studies*

2.3.1 *Syntax*

Most research on language contact and CLI between Quechua and Spanish has been in the area of syntactic transfer in Spanish as a result of contact with Quechua.

Early studies on syntactic transfer between Quechua and Spanish focused on word order (Lozano 1975, Puente 1981, Muysken 1984, and Lujan, Minaya, and Sankoff 1984). Quechua and Spanish differ typologically in that Quechua is a postpositional non-rigid V-final language, and Spanish is a prepositional non-rigid V-medial language (c.f. Greenberg 1966).

Lozano (1975) studied the Spanish of speakers in Ayacucho, Peru, where Spanish is in contact with Quechua. The Spanish spoken in this area of Peru is different from the standard variety spoken in Lima. Lozano's hypothesis was that there was influence from Quechua, and he looked at four cases where the Spanish of Ayacucho differed from the Spanish of Lima: double possessives, redundant indirect object clitics in relative clauses, object verb sequences, and the absence or variation of the object clitic when its referent has been mentioned.

(1) *era su amiga de Juan* "it was Juan's girlfriend."
(2) *el hombre que lo vi* "the man that I saw."
(3) *a Juan conocí* "I knew Juan."
(4) *lo veo a Juan* "I see Juan."

An example of double possessives is found in sentence (1). In sentence (1) both possessives *su* and *de* are not needed in the standard variety of Spanish. Sentence (2) illustrates having redundant indirect object clitics in relative clauses. In this sentence the clitic *lo* is redundant. Sentence (3) illustrates the difference in object-verb sequences in Ayacucho Spanish: *a Juan conocí* "I knew Juan." In the standard Spanish spoken in Lima the sequence would be *conocí a Juan* "I knew Juan." Lastly, Lozano looked at instances when the object clitic was absent when its referent was mentioned immediately before. In such a case, the speaker would either not have an object clitic or confuse *le / lo*, *les / los*. In sentence (4) the object clitic *lo* is used instead of *le*.

Puente (1981) studied the Spanish of speakers who were in contact with Quechua speakers. These speakers were from Huaycayo and Ayacucho, Peru.

Puente limited the scope of research to those who were more proficient in Quechua than in Spanish. The areas of research included double possessives, the absence or incorrect use of articles, the redundant use of the preposition *en*, and the frequent use of participles.

(5) *en alli esta creciendo la leña* "there (trees for) firewood is growing"
(6) *ya desyerbar terminando, a la yerba lo llevado a la casa* "already finishing weeding, I took the weeds to the house."

Sentence (5) illustrates the redundant use of the preposition *en*, "in," when used in expressions of location. In that example, the preposition is not needed with the determiner *alli*. Sentence (6) shows the frequent use of participles with the words *terminando* and *llevado*. The use of *a* as in "...*a la yerba*" is typical of many varieties of non-standard Spanish and is not limited to this regional variety.

Lujan, Minaya, and Sankoff (1984) studied bilingual children in Peru concerning their acquisition of Spanish. The population was made up of three five-year-olds, three seven-year-olds, and three nine-year-olds. In order to study word order, the researchers looked at the order of verb and object, adjective and noun, and possessor and possessed in the children's Spanish. The results showed evidence for CLI from Quechua since there was a high degree of verb-object, adjective-noun, and possessor-possessed in the younger children. Table 2.2 shows the results of the study and reveals that with age, the Quechua word order is replaced with Spanish word order.

Table 2.2: Word Order Acquisition Stages in Bilingual Children
(Lujan, Minaya, and Sankoff 1984:359)

Word Orders	Age 5	Age 7	Age 9
OV/VO	51/49%	40/60%	30/70%
Pr/Pd	63/37%	54/46%	36/64%
AN/NA	91/9%	60/40%	38/62%

Muysken (1984) studied Spanish in contact with Quechua in Ecuador. His results showed evidence of CLI from Quechua in what he called XV word order, "where X is a variable ranging over objects, predicates, sentential complements, and prepositional phrases (Muysken 1984:113). He found that Quechua-dominant bilinguals were more likely to have word order transfer from Quechua.

Recent studies have further explored syntactic transfer in Spanish in contact with Quechua. Klee (1990) studied the clitic pronoun system in Spanish in a Spanish-Quechua contact situation. In Spanish, direct object, indirect object, and reflexive pronouns are the same in the first-person singular, first-person plural, and second-person singular informal: *me*, *nos*, and *te*, respectively. Third-person pronouns differ, as shown in Table 2.3.

Table 2.3: Third Person Spanish Clitic Pronouns (Klee 1990: 37)

	Direct m., f.	Indirect	Reflexive
Third person singular:	*lo, la*	*le*	*se*
Third person plural:	*los, las*	*les*	*se*

Klee (1990) compared the use of clitic pronouns by monolingual Spanish speakers and bilingual Quechua-Spanish speakers. Quechua nouns, pronouns, and adjectives are not marked for gender and number as in Spanish. Object pronouns are also not overtly represented in the Quechua morphological system.

Table 2.4: Standard/Nonstandard Use of Clitic Pronouns by 18 Bilingual Speakers in Calca, Peru (Klee 1990:41)

	Professionals	**Middle Class**	**Lower Class**
se	515/530 (97%)	385/390 (99%)	355/381 (93%)
le	135/136 (99%)	134/138 (97%)	82/106 (77%)
les	100/115 (87%)	117/129 (91%)	14/28 (50%)
lo	78/122 (64%)	94/138 (68%)	69/141 (49%)
los	28/61 (46%)	23/68 (34%)	3/52 (6%)
la	7/58 (12%)	10/99 (10%)	1/73 (1%)
las	3/27 (11%)	6/44 (14%)	0/29 (0%)

The results are summarized in Table 2.4 and show that there is a difference in object pronoun usage according to social class. The bilingual speakers who are business professionals and those who are in the middle class are similar in that they use the third-person object pronouns *le, les, lo, los, la,* and *las*. However, the use of *la* and *las* is infrequent and these are often replaced with *lo* or *los* in speech. The lower class bilingual speakers use *la* and *las* even less in their speech. The result of contact with Quechua has been the loss of marking for gender and number in Spanish object pronouns in bilingual speakers.

Escobar (1997) studied the contrastive and innovative uses of the present perfect and preterite tenses in Spanish in contact with Quechua. In many areas of

the Andean region the contrast between the present perfect and the preterite tenses is neutralized (Escobar 1997:859). In Peru, however, Spanish that is in contact with Quechua shows a contrast between not only the present perfect and the preterite but also with the pluperfect. Escobar claims that the present perfect in this variety of Spanish is sensitive to the relationship between the location of the past event and that of the speaker at the moment of speech. As a result, the contrasts between the present perfect with the preterite and pluperfect are changed.

For example, migrants from Quechua-speaking parts of Peru were recorded after they had moved to Lima. The following sentences show the innovative use of the present perfect to show spatial reference.

(7) *y asi me <u>he quedado</u> [en Lima]* "and so I have stayed [in Lima]"

(8) *y cuando <u>fui</u> alla [a mi tierra] ya no me <u>pareció</u> tan bo-* "and when I went there [to my country] it didn't seem as pr- any more"

Escobar (1997:863) explains:

> The switches between the preterite and the present perfect in examples [7] and [8] coincide with the spatial context in which the event took place, i.e. whether it is in Lima (present perfect) or their place of origin (preterite). This distinctive use of the present perfect and the preterite mark spatial reference, i.e. whether the past event took place at a location coinciding with the here-and-now (where the speaker is at the moment of speech) or not.

2.3.2 *Phonetics and Phonology*

2.3.2.1 *General examples of cross-linguistic influence*

There has been very little written about phonological transfer on either Spanish or Quechua. One area where Quechua has influenced Spanish has been the transfer of the phoneme /š/ into Spanish. The phoneme /š/ is still found in the Quechua of Ecuador but is now lost in most varieties of Peruvian and Bolivian Quechua (Cotton and Sharp 1989:180). Examples of Spanish words with /š/ include words that were borrowed into Spanish such as shigra "type of tree," or "net to carry things in," and munashca "beloved" (Cotton and Sharp 1989:180). Nicknames in Andean Spanish often change Spanish [s] into [š] such as Shaba for "Sebastian," Mashi for "Macedonia," Pashi for "Pacifico", and Cashi for "Casimiro" (Hardeman-de-Bautista 1982:146, Cotton and Sharp 1989:180).

It has also been noted that the features of Spanish spoken in highland Peru such as the assibiliation of /r/ and the reduction of unstressed syllables have been a result of contact with Quechua or other native Peruvian languages (Lipski 1994:317).

Quechua has also influenced Andean Spanish phonology in keeping distinctions that were lost in other varieties of Spanish (Hardeman-de-Bautista 1982:147). Hardeman-de-Bautista (1982) also speculates that Andean Spanish preserves the /y/ ~ /λ/ contrast (which is lost in other Spanish varieties) due to contact with Quechua.

For example:

yema 'yolk' most Latin Am. Spanish: /yema/ Andean Spanish: /yema/

llame 'call!' most Latin Am. Spanish: /yame/ Andean Spanish: /λame/

The influence of Spanish on Quechua phonology has not been noted in previous contact studies.

> With only one exception [i.e. the borrowing of /š/ into Spanish], there have been no direct phonological borrowings between the Andean languages and Spanish. Hardeman-de-Bautista (1982:147)

> Virtually no phonological changes [in Quechua] can be attributed to the impact of Spanish. Mannheim (1991:98)

2.3.2.2 *Specific example of cross-linguistic influence*

Escobar (1976) is a more extensive study into the influence of Quechua on Spanish phonology. Escobar looks at the Spanish vowel system of speakers whose first language is Quechua. These speakers have migrated to Spanish-speaking areas from predominantly Quechua-speaking areas. He compares the Spanish of incipient bilinguals with those who are more advanced. Escobar defines his incipient or initial bilinguals as those who have the greatest amount of transfer from their L1 (Quechua) in their L2 (Spanish). These speakers also achieve the lowest points on a "Hispanization" scale. The variables considered included occupation, schooling, duration of exposure to Spanish, and index of the frequency of use of both Spanish and Quechua.

First, he compared the vowel system of monolingual Quechua speakers to the vowel system of monolingual Spanish speakers in terms of distinctive features.

Table 2.5: Vowel system of monolingual Quechua speakers (Escobar 1976:89)

	i	a	u
low	-	+	-
back	-	+	+

There are three Quechua phonemes, /i, a, u/. The allophones of /i/ are [ɪ] and [e] and the allophones of /u/ are [ʊ] and [o], the latter when found in the vicinity of uvular consonants.

Table 2.6: Vowel system of monolingual Spanish speakers (Escobar 1976:89)

	i	e	a	o	u
low	-	-	+	-	-
high	+	-	-	-	+
back	-	-	+	+	+

The Spanish vowel system of Spanish differs from Quechua in that /e/ and /o/ are phonemes in Spanish and that the feature of height is needed in Spanish according to Escobar, but his choice of features seems to be arbitrary. For example, the designation of /a/ as [+back] is controversial. In the IPA system, /a/ is a central vowel.

The pronunciation of Spanish by the incipient bilingual speaker reveals CLI from Quechua. The phonemes /i/ and /e/ and /u/ and /o/ merge into Quechua /i/ and /u/ respectively (usually realized phonetically as [ɪ] and [ʊ]). These mergers can create misinterpretations if, for example, a Spanish word with [e] is heard as [i] if pronounced with [ɪ]. For example, the word *mesa* "table" may be heard as *misa* "mass" if [ɪ] is used in place of [i] (c.f. Mannheim 1991: 103).

The advanced bilingual system is closer to the Spanish monolingual vowel system but there is still influence from Quechua. Spanish /i/ and /u/ have established themselves as separate phonemes as have /e/ and /o/, but the Spanish phonemes /e/ and /o/ retain the Quechua influence with allophonic variants [ɪ] and [ʊ] respectively.

Escboar (1976) also studied the influence of Quechua on the stress pattern of Spanish in bilingual speakers. Stress is not phonemic in Quechua, but it is in Spanish. For example, in *hablo* 'I speak,' stress is on the first syllable. In *habló* , 'he spoke,' stress is on the second syllable.

Incipient bilingual speakers always stress the penultimate syllable of the word. A monolingual Spanish speaker would pronounce the word *plátano* 'banana' with stress on the first syllable, but an incipient bilingual speaker would put the stress on the penultimate syllable *platáno*. Advanced bilingual speakers follow the

pattern set by monolingual Spanish speakers and only rarely regularize stress of irregularly stressed Spanish words (Escobar 1976:92).

The results found in Escobar (1976) have implications for the present study. He was able to put bilingual speakers on a continuum and group incipient bilinguals on one end and advanced bilinguals on the other for linguistic reasons. Quechua more heavily influenced the incipient bilingual speakers and this was revealed in Spanish in the vowel system (only three vowels) and in Spanish stress patterns. Advanced bilinguals had a Spanish vowel system and stress patterns closer to that of monolingual Spanish speakers.

Escobar (1976) also speculated as to the nature of the phonological systems of bilingual speakers. He wrote about cases of bilingualism in Peru which are similar to those looked at in this study. In initial bilinguals, he found mainly cases of substratum transfer where the L1 (Quechua) was influencing the L2 (Spanish). However, for advanced bilingual speakers he thought that there were cases of reverse transfer where the L2 (Spanish) had influence on the L1 (Quechua). He called this reciprocal interference since there was cross-linguistic influence in both directions, i.e. L1 to L2 and L2 to L1 (Escobar 1976:94). Escobar (1976:91) writes in reference to advanced bilingual speakers: "It seems less probable to maintain in this case that this is merely a question of interference as found in the initial bilingual. It would be more appropriate to speak of a degree of fusion between the systems of L1 and L2." Escobar and Wölck (c.f. 1972, 1988) argue

that a bilingual environment, such as the one in Peru between Spanish and Quechua speakers, results in reciprocal interference, i.e. reverse transfer and not only substratum transfer from Quechua to Spanish. This hypothesis corresponds with Selinker's 'interlanguage' in that evidence is presented to show that there is a single phonological system constructed from both languages.

Chapter 3

METHODOLOGY

3.0 *General Information on the Speech Community*

The town of Urubamba, Peru is located in the Urubamba river valley in the department of Cusco. The river is used for irrigation for the many farms that lie in the valley. The people of this region are predominately Quechua-speaking farmers. The town of Urubamba has a population of around 600 people and is about 40 miles north of the city of Cusco, the capitol city of the Cusco department.

The people living within the town of Urubamba are those who work in shops or restaurants in the city. There is a small but steady flow of tourists that goes through Urubamba since it is between Cusco and the ancient ruins of Machu Picchu. Those who live in town are mainly bilingual Spanish-Quechua speakers. There are very few monolingual Spanish speakers living in Urubamba. These are people such as teachers or clergy who move to Urubamba from other areas of Peru.

3.1 *Subjects*

3.1.1 *General Information*

Interviews were conducted in the summer of 1999 and the spring of 2000 in the village of Urubamba, Peru. The first interview session included fourteen subjects

and was the basis for the section on the Quechua vowel system (see section 4.1). This group included three monolingual Quechua speakers, two monolingual Spanish speakers, and nine bilingual speakers. The second interview session included twenty-four subjects and was the basis for the sections 4.2 and 4.3. This group included four monolingual Quechua speakers, three monolingual Spanish speakers, and seventeen bilingual speakers. Seven subjects were involved in both interview sessions. This information is in Table 3.1 for monolingual speakers and in Table 3.2 for bilingual speakers. A total of thirty-five people were interviewed and recorded reading word lists. The group of monolingual Spanish speakers was recorded reading a Spanish word list (see Appendix A for Spanish word list). All of the interviews were conducted in Spanish with the use of an interpreter for interviews with monolingual Quechua speakers. The interviews were held in homes or outdoors in a central public area and lasted between 30 and 45 minutes. Questions were asked concerning the respondents' use of Quechua and their attitudes toward the language situation in Peru. The word lists were also recorded outdoors, and the sessions lasted about 15 minutes.

TABLE 3.1: List of Monolingual Subjects

Subject	Group	Interview
Florenica	Quechua	1999, 2000
Jaime	Quechua	2000
Mercedes	Quechua	1999, 2000
Pilar	Quechua	1999, 2000
Marcelo	Spanish	1999, 2000
Pedro	Spanish	2000
Teresa	Spanish	1999, 2000

3.1.2 *Determination of Language Dominance*

On the basis of the interviews and before any investigation of phonetics, subjects were divided into three groups: (1) those who were monolingual Quechua speakers, (2) those who were bilingual Spanish-Quechua speakers, and (3) those who were monolingual Spanish speakers.

Relative language proficiency was determined for the bilingual speakers in group two on the basis of four factors: age of acquisition, place of acquisition, subject self-evaluation, and interviewer evaluation. Table 3.2 displays an alphabetical list of subjects that includes the alias used, age, sex of subject, and

information on each factor in order to show how bilingual proficiency was determined.

TABLE 3.2: Determination of Language Proficiency

Name (alias)	S	Age	Spanish Acquisition		Place		Self		Interviewer		T
Adelaida[2]	F	23	SS	-	RU	-	QD	-	QD	-	0
Alejandro[2]	M	49	T	+	Urubamba	+	SD	+	SD	+	4
Bernabe[2]	M	21	SS	-	Urubamba	+	QD	-	QD	-	1
Carlos[2]	M	37	SS	-	RU	-	SD	+	QD	-	1
Celia[2]	F	17	SS	-	RU	-	QD	-	QD	-	0
Damaris[1]	F	19	SS	-	Paucartambo	-	QD	-	QD	-	0
Damaso[1]	M	32	T	+	Urubamba	+	SD	+	SD	+	4
Dolores[2]	F	46	T	+	Urubamba	+	SD	+	SD	+	4
Edgar[2]	M	19	SS	-	Urubamba	+	QD	-	QD	-	1
Einar[2]	M	20	T	+	Urubamba	+	SD	+	SD	+	4
Esteban[2]	M	22	T	+	Urubamba	+	SD	+	SD	+	4
Inmaculad[1]	F	31	SS	-	Biljue	-	QD	-	QD	-	0
Irene[2]	F	17	SS	-	RU	-	QD	-	QD	-	0
Isabel[1]	F	30	C	+	Cusco	+	SD	+	SD	+	4
Jemima[2]	F	20	T	+	Urubamba	+	SD	+	SD	+	4
Juana[2]	F	35	T	+	Puno	+	SD	+	SD	+	4
Laura[1,2]	F	29	C	+	Abancay	-	SD	+	SD	+	3
Lorena[1,2]	F	16	C	+	Urubamba	+	SD	+	SD	+	4
Lucha[2]	F	24	T	+	Urubamba	+	SD	+	SD	+	4
Luis[2]	M	39	A	-	RU	-	QD	-	QD	-	0
Magdelana[2]	F	22	SS	-	RU	-	QD	-	QD	-	0
Maria[2]	F	45	T	+	Urubamba	+	SD	+	SD	+	4
Marisa[2]	F	20	SS	-	RU	-	QD	-	QD	-	0
Nestor[2]	M	18	SS	-	RU	-	QD	-	QD	-	0
Roberto[1,2]	M	38	SS	-	RU	-	QD	-	QD	-	0
Segundina[1]	F	27	SS	-	Altocanas	-	QD	-	QD	-	0
Veronica[2]	F	19	SS	-	RU	-	QD	-	QD	-	0
Wilfredo[2]	M	19	SS	-	RU	-	QD	-	QD	-	0

1 = interviewed in 1999, 2 = interviewed in 2000, C = acquired Spanish as a child, SS = acquired some Spanish, T = acquired Spanish as teenager, A = adult learners of Spanish, QD = Quechua-dominant, SD= Spanish-dominant, Age = age at time of interview

In each category, a plus was used if the variable was more likely to result in Spanish-dominant bilingualism, and a minus was used if the variable would favor Quechua-dominant status. Only pluses were counted, and therefore, the higher the number (e.g. 3 or 4) the more likely the speaker would fit into the category of Spanish-dominant bilingual. Those with a score of three or four were considered Spanish-dominant bilingual, and those with scores of zero and one fell into the category of Quechua-dominant bilingual. There were no subjects with the score of two.

3.1.2.1 *Age as a factor for language proficiency*

All the bilingual speakers in this study had Quechua as their first language. Age of Spanish acquisition, however, seems to have an influence as to whether a speaker is Quechua-dominant or Spanish-dominant. Some subjects spoke primarily Quechua at home and learned a little Spanish in their life. These subjects received the rating 'SS', indicating that they have learned some Spanish. According to the interviews, virtually no Spanish was used inside the homes of these subjects. Their parents spoke Quechua and they would have some exposure to Spanish if they attended school. Childhood friends would also have been Quechua-speaking and have come from similar family situations.

Subjects who acquired an ability to speak Spanish before adulthood, received the rating 'C' if they acquired Spanish as children, and 'T' if acquisition occurred

during their teenage years. There was considerable individual variation here. Laura's parents saw the importance for learning Spanish and encouraged her to use it in the home. Isabel's parents stopped speaking Quechua to her and only spoke Spanish, but Isabel continued to use Quechua with her grandmother who lived with her family. Other subjects learned Spanish from their contact with Spanish-speaking friends. This exposure to Spanish at an early age, whether through parents or peers, yielded Spanish-dominant bilingual speakers.

Another group of subjects included those who had had virtually no exposure to Spanish until adulthood. These subjects have the rating of 'A,' indicating that they are adult learners of Spanish. Little exposure to Spanish in early years of life, as is the case of adult learners, tends to result in Quechua-dominant bilingual speakers.

3.1.2.2 *Place of acquisition as a factor for language proficiency*

The environment in which a person grew up can also play a role in determining language dominance. Those who grew up in the rural Urubamba valley with its rich Quechua culture had little exposure to Spanish. Exposure to Spanish would come from school and from the weekly or monthly visits to the village of Urubamba for market day. Those who grew up in the town of Urubamba are likely to have had more contact with Spanish than those from the rural areas. The people who live in the village of Urubamba are involved in jobs in which Spanish usage is required, such as running a business or working for the government.

For example, Damaris comes from the area of Paucartambo. This is an area east of the city of Cusco in the department of Cusco that borders the department of Madre de Dios. This is a rural and heavily Quechua area. Her exposure to Spanish only came outside of the home during her time in school. Other speakers, such as Roberto and Luis, simply said that they were from "el campo" which means from the rural countryside. The only exposure to Spanish would be their time in the village of Urubamba at the weekly market.

Subjects who came from cities were more likely to have exposure with Spanish. For example, Isabel came from the city of Cusco and Juana from the city of Puno. Each is the capitol city of Peruvian departments of the same name. The city of Cusco has a population of about 120,000 and Puno about 80,000 (INEP 1999). Those who grew up in an urban setting received a '+' in the column for 'place.' Those from rural areas received a '-.'

3.1.2.3 *Interviewer Evaluation*

In general, then, four factors were used in order to determine bilingual proficiency: age of acquisition, place of acquisition, subject self-evaluation, and interviewer evaluation. Only once did the subject self-evaluation and the interviewer evaluation differ. Carlos said that he was a Spanish-dominant bilingual. The interviewer evaluation concluded that Carlos was a Quechua-dominant bilingual since he had difficulty with Spanish during the interview.

When the other two categories are checked, i.e. age and place of acquisition, the subject falls within the Quechua-dominant range. He learned some Spanish as a youth, and he lived in rural Urubamba as a farmer.

Phonetic features were not used to determine bilingual proficiency. There was no circularity, since pronunciation was not a factor in making the separate evaluations or the final evaluation based on all four criteria. The interviewer paid attention to the subject's ability to communicate in Spanish and if they relied on an interpreter to complete the interview.

3.2 *Data Collection*

Quechua language data was collected in two ways. First, bilingual speakers were given a Quechua word list to read (see Appendix B for Quechua word list). Second, monolingual Quechua speakers and bilingual speakers recited hymns in Quechua (see Appendix C for list of hymns). The hymns were spoken so they were considered equivalent to the Quechua word list or reading passage so far as stylistic level was concerned. The interviews concerning Quechua language use and language data collection were both recorded using a cassette tape recorder (Sony TCM-929) equipped with an external microphone (Sony ECM-T6). The words were chosen in order to compare all three Quechua vowels, to look at aspiration and glottalization, and to compare the velar and uvular phone in bilingual speakers. The words starting with the uvular stops were also chosen in

order to see if the allophonic rule backing the high vowel next to the uvular applies in a bilingual system. The words are listed alphabetically in Appendix B and are written phonetically. The word list was given in random order to the subjects.

Table 3.3 lists the number of Quechua vowel tokens found in the word list. Vowel tokens by phonetic environment are also listed. Subjects were recorded reading the list two or three times, but the frequency numbers are for one reading of the word list.

TABLE 3.3: Frequency of Quechua [ɪ, a, ʊ] tokens

Vowel token		Number of occurrences
[ɪ]	Total #	29
[a]	Total #	33
[ʊ]	Total #	19
[ɪ]	after uvular phonemes /q, q^h, q'/	8
[ɪ]	after phonemes /p, t, k, č/*	21
[ʊ]	after uvular phonemes /q, q^h, q'/	7
[ʊ]	after phonemes /p, t, k, č/*	17

* Includes the aspirated and glottalized forms of each

Words were also chosen for the word list in order to study aspiration and glottalization in Quechua. Initial plain, aspirated, and glottalized forms of voiceless stops were chosen for the word list. All of the voiceless stops in

Quechua were included, e.g. /p, t, k, q/. The voiceless affricate /č/ was also included.

3.3 *Analyses*

Formant frequencies of the vowels were extracted from tape-recorded data by transforming the acoustic sound files to a sampling frequency of 10 kHz. Linear Predictive Coding (LPC) was applied by using the acoustic analysis program Signalyze (version 3.12) on a Power Macintosh 7200. A data file was prepared for each subject listing the F1 and F2 scores, vowel class, stress, and word for each token (See Appendix D for data files).

The data file was opened in the vowel system analysis program Plotnik (version 4.0). After all of the data files were completed, group means were calculated and the data was normalized. Normalization is a procedure that eliminates vowel differences between speakers due to vocal tract length while keeping other differences so that the systems can be directly compared to each other.

Vowel height and backness were compared between language usage groups (e.g. Monolingual Quechua speakers vs. Spanish-dominant bilinguals) by using a t-test. A t-test shows whether the height and backness of vowels of monolingual Quechua speakers and Spanish-dominant bilinguals are significantly different.

The voice onset time (VOT) was measured using the acoustic program Praat (version 3.9.10). In order to measure the VOT of voiceless stops, a sound file was

opened in Praat. A waveform and a spectrograph were then created for each word. The waveform was marked at the onset of the release of the stop and at the place where voicing begins. The duration of the VOT was then measured by subtracting the first number from the second. In Praat, spectrographs were also used to compare plain, aspirated, and glottalized phones in Quechua.

Chapter 4

RESULTS

4.0 *Introduction*

In this chapter I detail the results of an acoustic study of Quechua phones in bilingual speakers. This study will compare the Quechua vowel system of bilingual speakers with that of monolingual speakers of both Quechua and Spanish. This will show the position of vowels within the system and compare the relative height and backness of vowels of monolingual and bilingual speakers. These results will also describe the difference in allophonic rule application between Spanish-dominant and Quechua-dominant bilinguals. Analyses concerning voice onset time in Quechua and the aspiration and glottalization of Quechua voiceless stops are also presented.

This chapter is organized as follows. In section 4.1 I give the results of the vowel quality study and present data that shows the relative position of vowels in the Quechua vowel system of bilingual speakers. In section 4.2 I report on the results of VOT measurement of Quechua voiceless stops in bilingual speakers. Section 4.3 discusses the possibility of a phonemic merger in bilingual speakers. First, aspiration and glottalization will be compared between Quechua-dominant and Spanish-dominant bilingual speakers. Second, I will explore whether or not uvular and velar phonemes merge in bilingual speakers.

4.1 *Influence on the Quechua Vowel System*

The first research area relates to the position of vowels within the Quechua vowel system. The question is whether a bilingual speaker will produce Quechua vowels differently than monolingual Quechua speakers. Quechua vowels were analyzed from monolingual Quechua speakers as well as from bilingual Spanish-Quechua speakers. As detailed in section 3.3, I used the computer program Signalyze to extract the F1 and F2 values from the Quechua vowels /ɪ/, /a/, and /ʊ/. These values are then compared with those of monolingual Quechua speakers and monolingual Spanish speakers. It is hypothesized that bilingual speakers will produce their Quechua vowels differently than monolingual speakers as a result of contact with Spanish.

Second, we will look at the application of the allophonic rule in Quechua that backs and lowers the high vowels when they are in the vicinity of a uvular stop /q/, including glottalized [q'] or aspirated [q^h]. This rule does not occur in Spanish (obviously, since there are no uvular stops). It is hypothesized that Spanish-dominant bilinguals would not apply this rule in their Quechua under influence from Spanish. It is also hypothesized that Quechua-dominant bilinguals would retain this allophonic rule in Quechua.

4.1.1 Mon

Figure

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4.1.1 *Monolingual Spanish speakers*

Figures 4.1 and 4.2 show vowel systems for two monolingual Spanish speakers. These figures are based on the average formant frequencies vowel tokens for each subject.

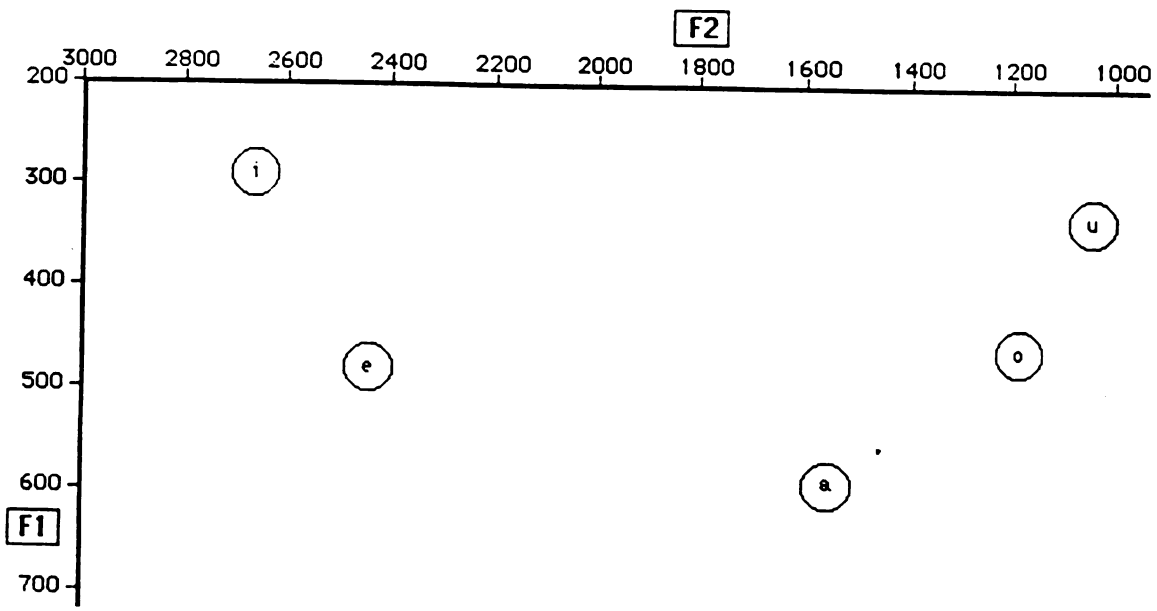


Figure 4.1: Marcelo (Monolingual Spanish speaker)

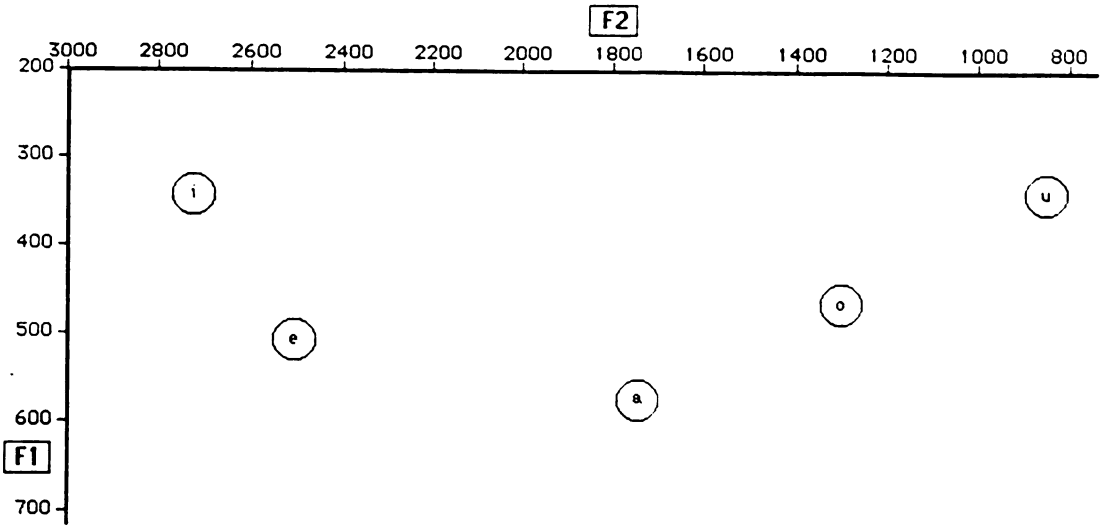


Figure 4.2: Teresa (Monolingual Spanish speaker)

The range of vowel frequencies for monolingual Spanish speakers is presented in Table 4.1.

TABLE 4.1: Range of Vowel Frequencies for Monolingual Spanish Speakers

/i/	F1: 250 – 350	F2: 2600 – 2800
/e/	F1: 400 – 450	F2: 2400 – 2600
/a/	F1: 500 – 600	F2: 1600 –1800
/o/	F1: 400 – 500	F2: 1200 – 1400
/u/	F1: 300 – 400	F2: 800 – 1200

The vowel frequencies for Marcelo (Figure 4.1) were lower than Teresa's (Figure 4.2) due to the tendency for male vowel frequencies to be lower. The data for monolingual Spanish speakers agrees with previous work in Spanish acoustic phonetics as detailed in section 2.2.1.

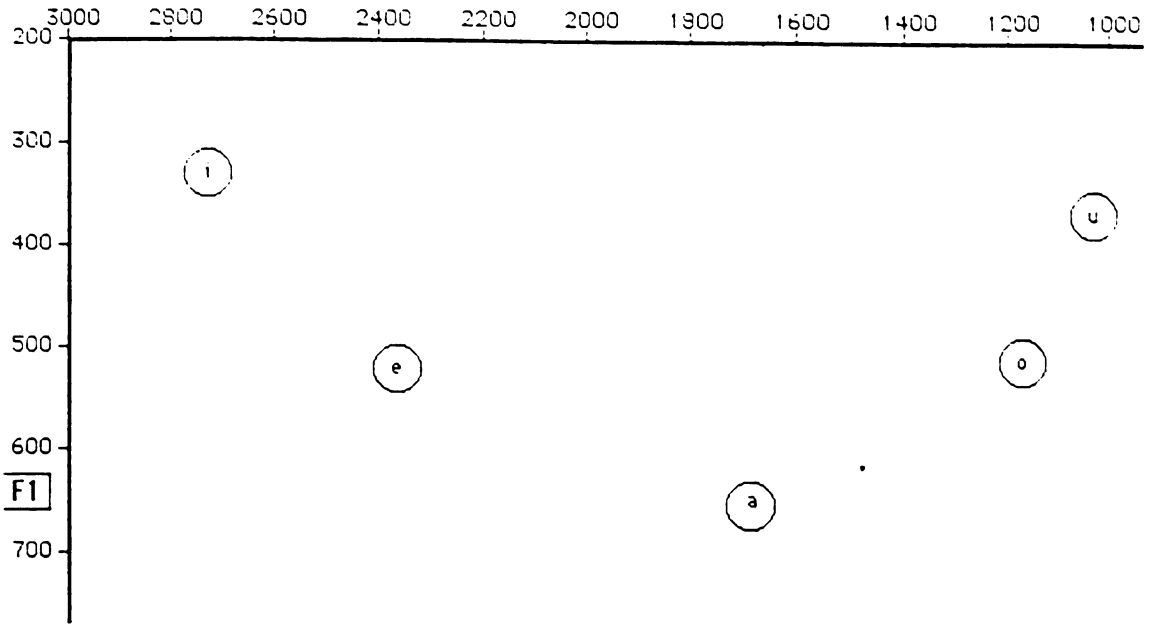


Figure 4.3: Monolingual Spanish System (Normalized data)

Figure 4.3 shows the vowel system of both of the monolingual Spanish speakers combined (Their individual results were shown in Figures 4.1 and 4.2). Figure 4.3 is made up of the formant frequencies of both speakers and averaged together. The normalization process allows generalizations to be made between groups of speakers. See Appendix D for list of vowels used in making Figures 4.1 to 4.3.

4.1.2 *Monolingual Quechua speakers*

4.1.2.1 *Quechua Vowel System*

Figures 4.4 and 4.5 are examples from monolingual Quechua speakers. The following symbols are used in these figures: (iq) and (uq) to refer to the high vowels /ɪ/ and /ʊ/ respectively when in the vicinity of the uvular phone, and (e) and (o) to refer to instances of borrowed words from Spanish that contain the phones [e] and [o]. The symbols (i), (a), and (u) correspond to the phonemes /ɪ/, /a/, /ʊ/ in Quechua.

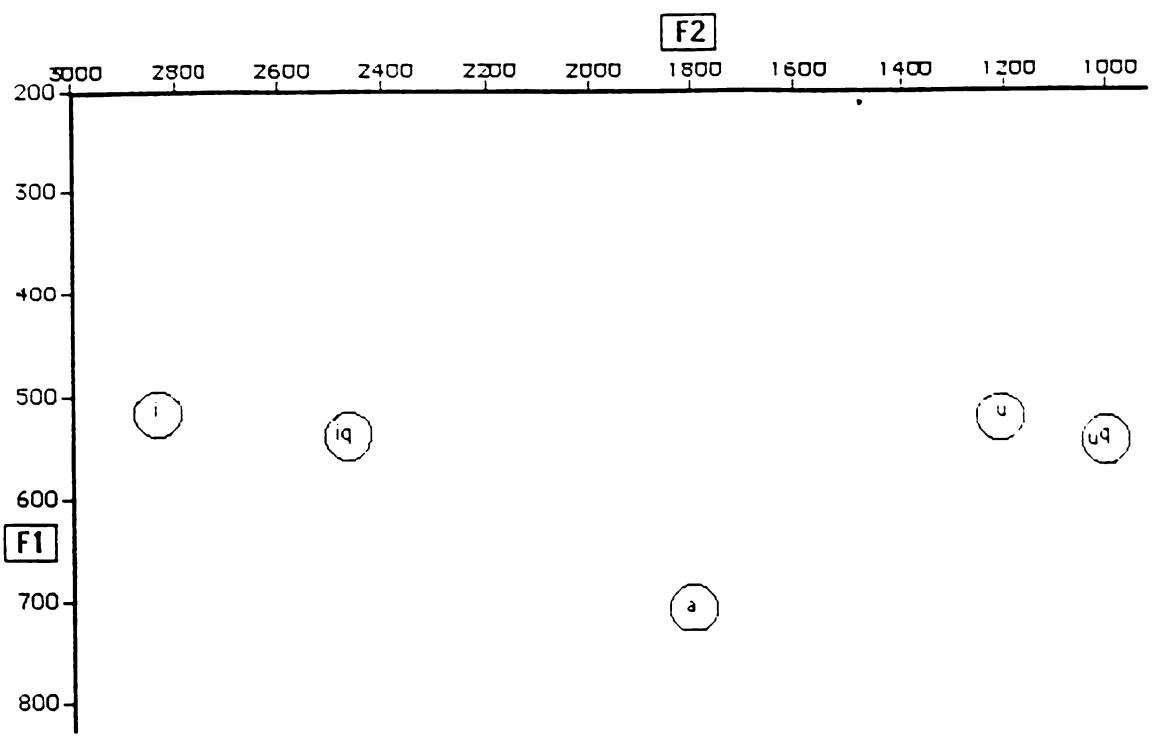


Figure 4.4: Florencia (Monolingual Quechua speaker)

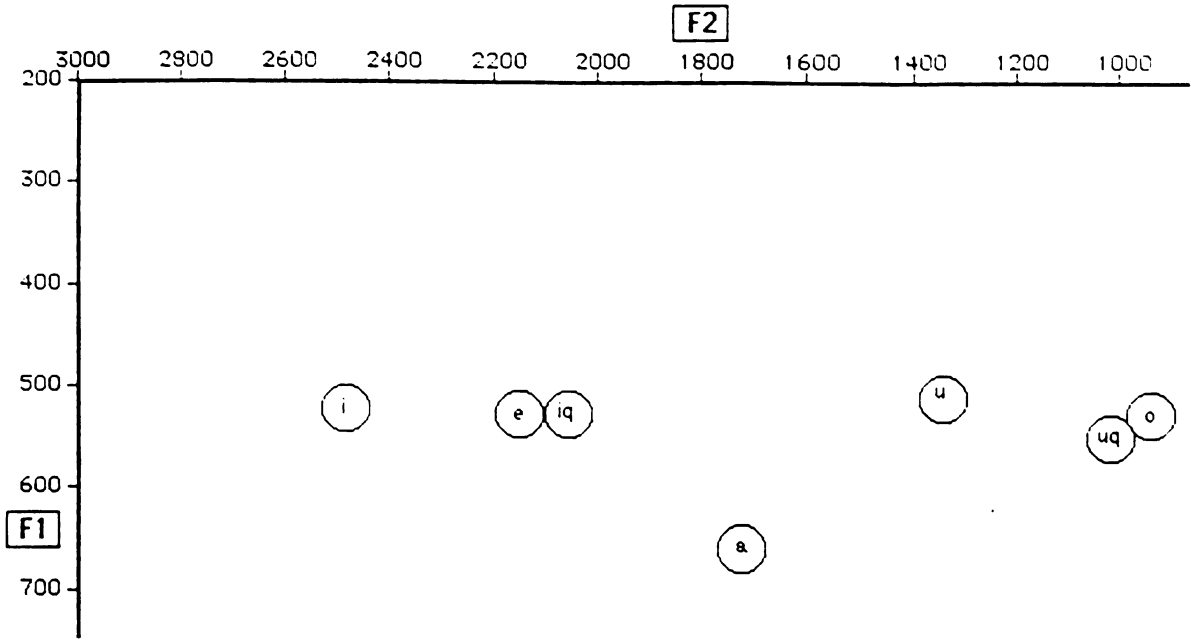


Figure 4.5: Pilar (Monolingual Quechua speaker)

The range of vowel formant frequencies for monolingual Quechua speakers is shown in Table 4.2.

TABLE 4.2: Range of Vowel Frequencies for Monolingual Quechua Speakers

/ɪ/	F1: 500 – 600	F2: 2000 – 2800
/a/	F1: 600 – 800	F2: 1600 –1900
/ʊ/	F1: 500 – 600	F2: 1000 – 1400

The data presented in Table 4.2 show that the range for the Quechua high vowels is lower than those in the Spanish system as shown in Table 4.1.

4.1.2.2 *The Application of the Allophonic Rule in Quechua*

In Figures 4.4 and 4.5 (iq) and (uq) represent the pronunciation of /ɪ/ and /ʊ/ respectively when in the vicinity of /q/. The Quechua allophones (iq) and (uq) are at the same height as [e] and [o], respectively, of the Spanish borrowed words (and of the Spanish monolingual system), but somewhat farther back. The comparison between monolingual Quechua and monolingual Spanish speakers in regards to these vowels is shown in Table 4.3. The numbers of words with the borrowed vowels [e] and [o] from Spanish are small in number and are here for reference purposes only. These words were not a part of the original word list and come from the list of Quechua hymns.

TABLE 4.3: Comparison of Spanish /e/ and Monolingual Quechua /ɪ/ in Vicinity of /q/

Monolingual Spanish /e/	**F1:**	**F2:**
Teresa (fig, 4.2)	500 – 600	2400 – 2600
Mono. Quechua /ɪ/ / /q/	**F1:**	**F2:**
Florencia (fig. 4.4)	500 – 600	2400 – 2600
Pilar (fig. 4.5)	500 – 600	2000 – 2200

Normalized data from monolingual Quechua speakers are illustrated in Figure 4.6. The vowel data were combined and averaged from all three monolingual Quechua speakers. See Appendix D for list of vowels used in Figure 4.6.

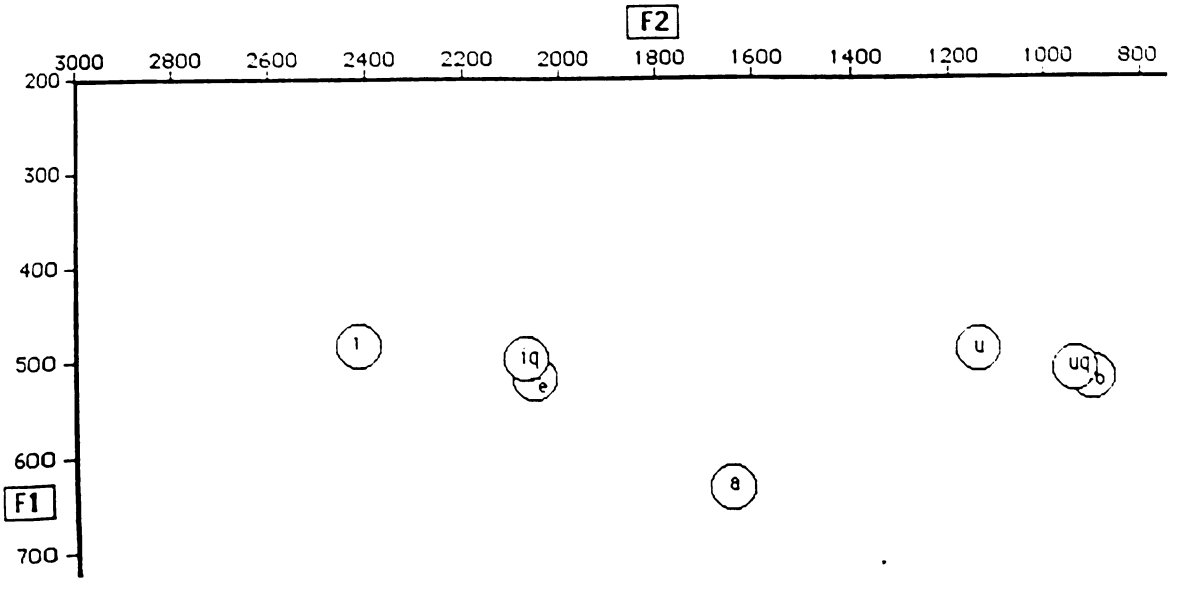


Figure 4.6: Monolingual Quechua System (Normalized data)

T-test results comparing /e/ and /ɪ/ in the vicinity of /q/ showed no significance between the two in vowel height or backness. The results for /o/ and /ʊ/ in the vicinity of /q/ were also not significant for vowel height and backness. Figure 4.7 shows the standard deviation ranges for the normalized data presented in Figure 4.6. There are between 15 - 20 tokens for each vowel examined. The area in which the high vowels /ɪ/ and /ʊ/ occur do not overlap with the instances of when the high vowels are in the vicinity of /q/. The vowels (e) and (o) (i.e., the Spanish loan-word phones) overlap with /ɪ/ and /ʊ/ in the vicinity of /q/, respectively.

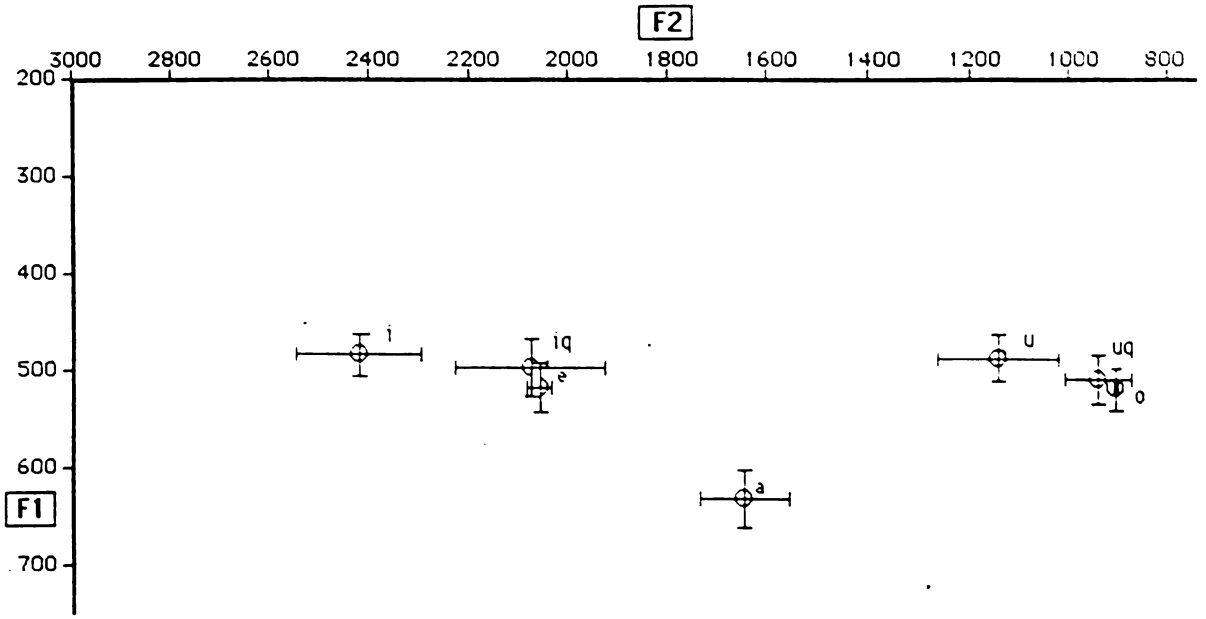


Figure 4.7 Standard Deviations of Monolingual Quechua Vowels

4.1.3 *Spanish-Dominant Bilingual Speakers*

4.1.3.1 *Quechua Vowel System*

Bilingual speakers who were Spanish-dominant had a Quechua vowel system that differed from that of monolingual Quechua speakers. Their Quechua system was closer to that of the monolingual Spanish system due to the height of /i/ and /u/. Figures 4.8 and 4.9 illustrate the Quechua vowel system of Spanish-dominant bilinguals.

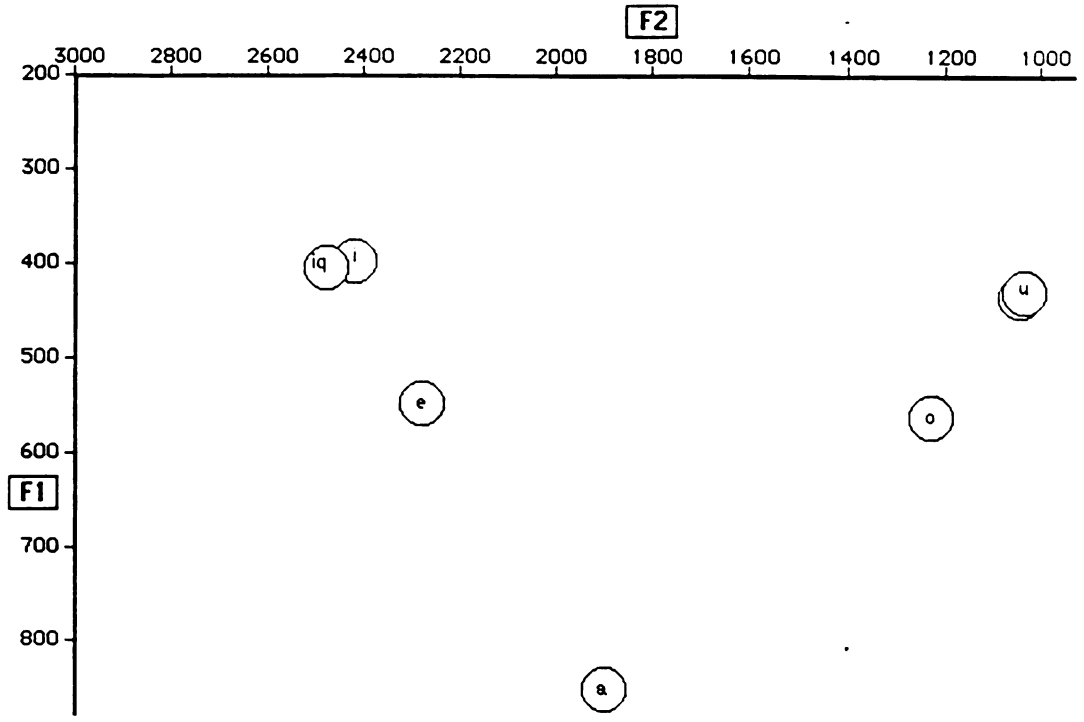


Figure 4.8: Lorena (Spanish-Dominant Bilingual speaker)

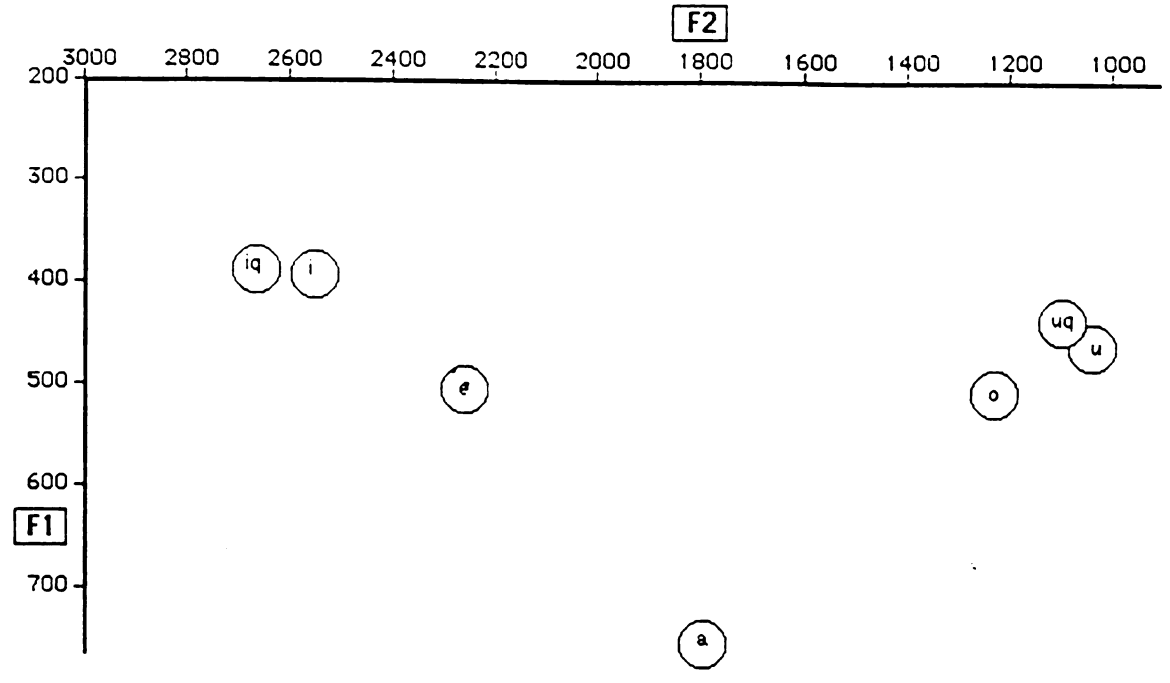


Figure 4.9: Laura (Spanish-Dominant Bilingual speaker)

Spanish-dominant bilinguals still appear to have a three-vowel system in Quechua however the high vowels are raised near the Spanish level. Table 4.4 shows the range of vowel formant frequencies for Spanish-dominant bilingual speakers.

TABLE 4.4: Range of Vowel Frequencies for Spanish-Dominant Bilingual Speakers

/ɪ/	F1: 300 – 400	F2: 2200 – 2800
/a/	F1: 700 – 900	F2: 1600 – 2000
/ʊ/	F1: 300 – 500	F2: 900 - 1200

When we compare the Spanish-dominant bilingual's vowel system with that of a monolingual Spanish speaker we find similarities in the vowel height and backness of the high vowels. Table 4.5 presents the range of formant frequencies for Spanish /i/ and /u/ found in monolingual Spanish speakers and Quechua /ɪ/ and /ʊ/ for Spanish-dominant bilingual speakers.

TABLE 4.5 Comparison of Quechua /ɪ/ and /ʊ/ with Spanish /i/ and /u/

Vowel	Speakers	F1	F2
/i/	Mono. Spanish	300 – 400	2600 - 2800
/ɪ/	Spanish-dominant Bilingual	300 – 450	2200 – 2800
/ɪ/	Mono. Quechua	500 – 600	2000 – 2800
/u/	Mono. Spanish	300 – 400	800 – 1200
/ʊ/	Spanish-dominant Bilingual	300 – 500	800 - 1200
/ʊ/	Mono. Quechua	500 – 600	1000 - 1400

In short, when comparing the Spanish-dominant bilinguals with monolingual speakers of Quechua and Spanish we find that the height of the high vowels is closer to Spanish /i/ and /u/ than to Quechua /ɪ/ and /ʊ/.

4.1.3.2 *The Application of the Allophonic Rule in Quechua*

The Quechua vowel system of Spanish-dominant bilinguals does not have the allophonic rule in Quechua that backs the high vowels.

TABLE 4.6 Comparison of Formant Frequencies of /ɪ/ and /ʊ/ in the Vicinity of /q/

Subject	Vowel	Context	F1	F2
Lorena	/ɪ/ in [qɪspɪčɪqλay]	(iq)	407	2439
	/ɪ/ in [qɪspɪčɪqλay]	(iq)	406	2520
	/ɪ/ in [wɪλamuq]	(i)	406	2344
	/ɪ/ [qɪspɪkuymanta]	(i)	399	2445
	/ʊ/ in [qʊnaykɪpaq]	(uq)	420	1064
	/ʊ/ in [wɪλamʊq]	(uq)	413	1016
	/ʊ/ in [tʊkʊy]	(u)	399	1090
Laura	/ɪ/ in [qɪspɪčɪqpaq]	(iq)	372	2642
	/ɪ/ in [qɪspɪčɪqman]	(iq)	407	2683
	/ɪ/ in [λank'ananpɪ]	(i)	363	2567
	/ɪ/ in [mʊnanɪ]	(i)	373	2547
	/ʊ/ in [ñʊqaq]	(uq)	440	1043
	/ʊ/ in [mʊnakaq]	(u)	481	942
	/ʊ/ in [pʊsaspa]	(u)	488	1077
	/ʊ/ in [mʊnanɪ]	(u)	393	995

Table 4.6 gives examples of isolated words in order to illustrate that there is no significant change to the height or backness of Quechua vowels /ɪ/ or /ʊ/ when in

the vicinity of /q/. The vowels /ɪ/ and /ʊ/ in the vicinity of /q/ are signified with the symbols (iq) and (uq) respectively. As shown in Table 4.6, the first vowel /ɪ/ in *qispichiqllay* and the /ɪ/ in *willamuq* for Lorena have the same general height (F1s are 407 and 406 respectively). Laura does not lower the vowel /ʊ/ in *ñuqaq* and *munakuq* but her vowels fall in the same general area as the vowel /ʊ/ in *pusaspa* and *munani* .

Figure 4.10 gives the normalized data for Spanish-dominant bilingual speakers. This is based on the results of five Spanish-dominant bilingual speakers. See Appendix D for list of vowels measured for Figure 4.10.

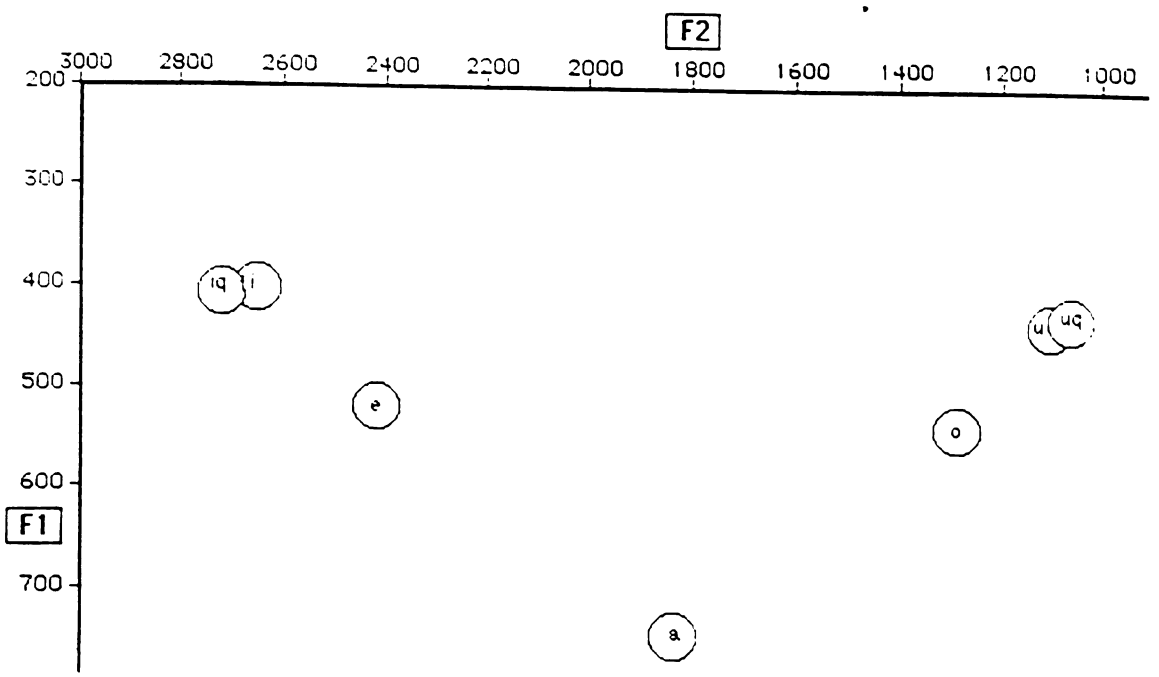


Figure 4.10: Spanish-dominant Bilingual System (Normalized Data)

When the vowel frequencies for /ɪ/ and /ʊ/ are compared with the instances when /ɪ/ and /ʊ/ are in the vicinity of /q/, no significant difference is found for height and backness. In the Spanish-dominant bilingual system, there is a distinction between borrowed [e] ~ [o] and when /ɪ/ and /ʊ/ are near /q/. T-test results for each fall into the (<.001) range for height and backness which means there is a significant difference unlike in the monolingual Quechua system where borrowed [e] and [o] were grouped with the allophones /ɪ/ and /ʊ/ near /q/. This difference can be explained by the fact that the allophonic rule is not applied in the Spanish-dominant bilingual's Quechua system.

Figure 4.11 shows the standard deviation ranges for the normalized data presented in Figure 4.10. There is an average of 15 - 20 tokens for each vowel examined. See appendix D for the complete listing of vowel tokens used in Figure 4.11. It is clearly shown that /ɪ/ and /ʊ/ overlap with those high vowels that are in the vicinity of /q/.

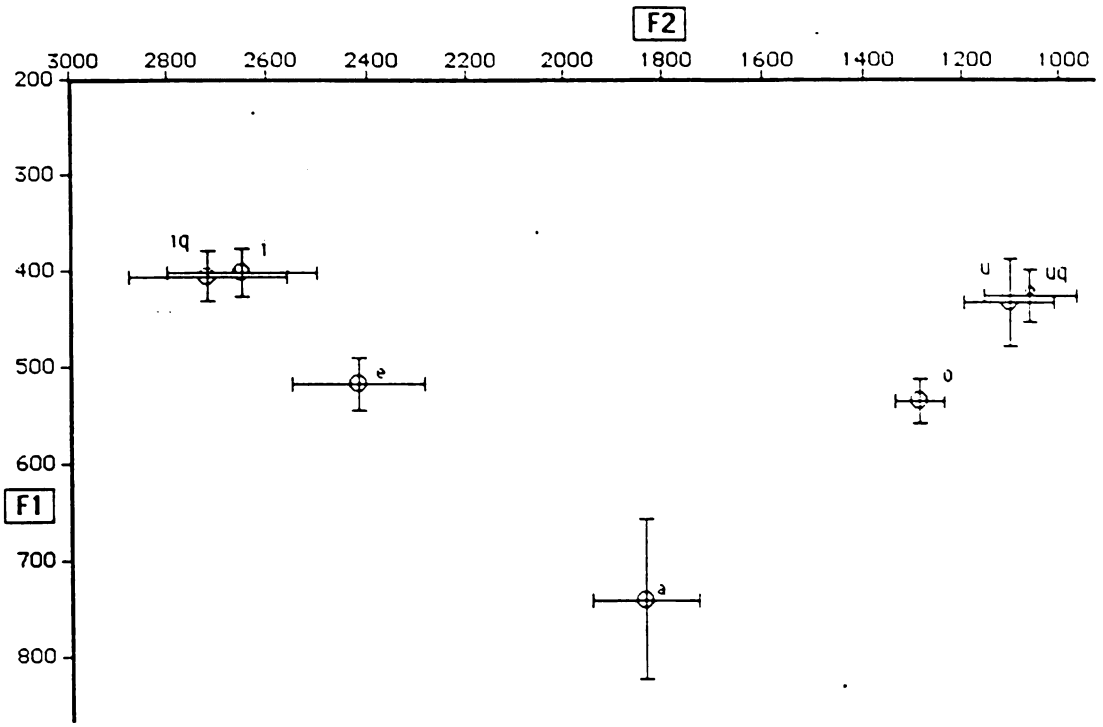


Fig. 4.11: Standard Deviations of Spanish-Dominant Bilingual Vowels

4.1.4 *Quechua-Dominant Bilingual Speakers*

4.1.4.1 *Quechua Vowel System*

Now we come to bilingual speakers who are Quechua-dominant. Their Quechua system has three vowels and retains the allophonic rule that is lost in the Spanish-dominant system. The difference between the bilingual and monolingual Quechua system in this instance is that the high vowels are raised just as they are in the Spanish-dominant system. Figures 4.12 and 4.13 illustrate the Quechua vowel system of Quechua-dominant bilinguals. The Quechua vowel system of Damaris in Figure 4.12 is different from Roberto's vowel system (Figure 4.13).

Although the /q/-influenced allophones are not dramatically lower for Roberto, we will see in Figure 4.14 that there is overall lowering in the Quechua vowel system of Quechua-dominant bilinguals. Figure 4.13 does not include (e) and (o) because there were not enough instances of words recorded with those vowels.

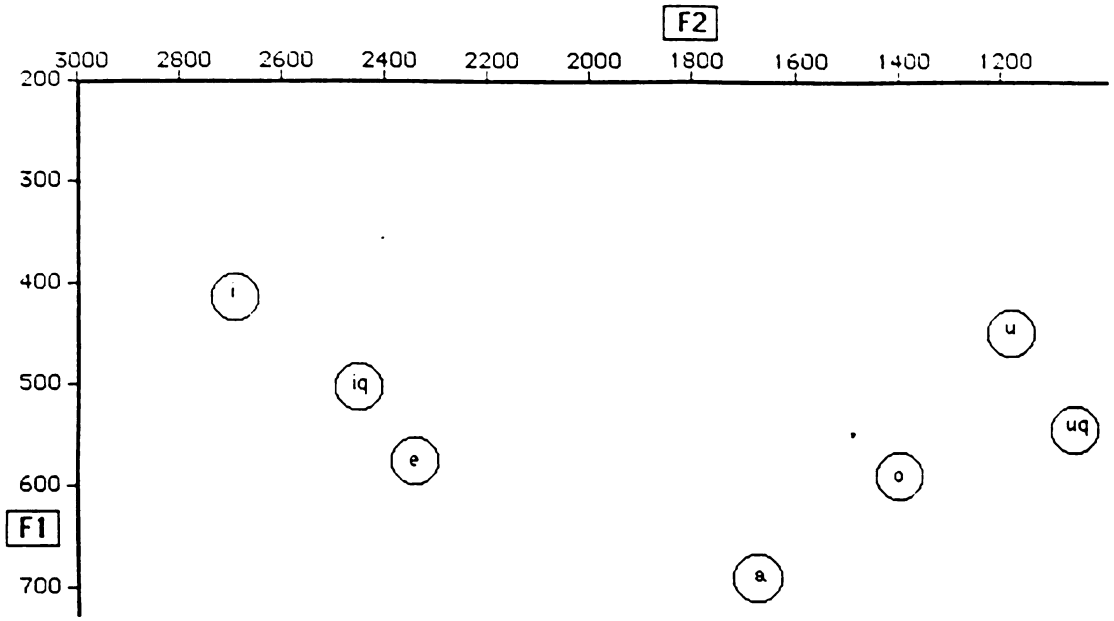


Figure 4.12: Damaris (Quechua-Dominant Bilingual)

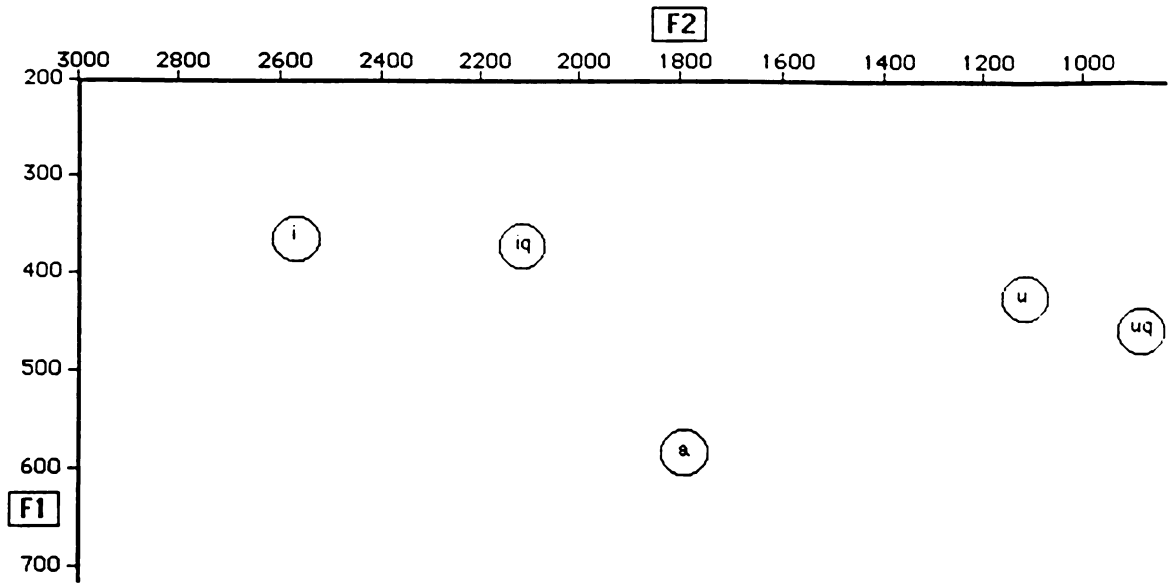


Figure 4.13: Roberto (Quechua-Dominant Bilingual)

Table 4.7 shows the range of vowel formant frequencies for Quechua-dominant bilingual speakers.

TABLE 4.7: Range of Vowel Frequencies for Quechua-Dominant Bilingual Speakers

/ɪ/	F1: 300 – 450	F2: 2000 – 2900
/a/	F1: 600 – 800	F2: 1600 – 1800
/ʊ/	F1: 350 – 550	F2: 900 - 1300

Table 4.8 shows the range of formant frequencies of the Quechua vowels /ɪ/ and /ʊ/ in both monolingual Quechua speakers and Quechua-dominant bilinguals and compares those values with monolingual Spanish vowels /i/ and /u/.

TABLE 4.8: Comparison of Quechua /ɪ/ and /ʊ/ with Spanish /i/ and /u/

Vowel	Speakers	F1	F2
/i/	Monolingual Spanish	300 – 400	2600 - 2800
/ɪ/	Quechua-dominant Bilingual	300 – 450	2500 – 2900
/ɪ/	Monolingual Quechua	500 – 600	2000 – 2800
/u/	Monolingual Spanish	300 – 400	800 – 1200
/ʊ/	Quechua-dominant Bilingual	350 – 550	900 - 1300
/ʊ/	Monolingual Quechua	500 – 600	1000 - 1400

Quechua-dominant bilingual speakers, therefore, are similar to Spanish-dominant bilinguals in raising their high vowels in Quechua to the range of /i/ and /u/ in Spanish.

4.1.4.2 *The Application of the Allophonic Rule in Quechua*

The Quechua system of bilingual Quechua-dominant speakers is a three-vowel system that retains the allophonic rule that is lost in the Spanish-dominant system.

Quechua-dominant bilinguals seem to keep the Quechua allophonic rule of backing the high vowels in the vicinity of a uvular consonant.

TABLE 4.9: Comparison of Formant Frequencies of /ɪ/ and /ʊ/ in the Vicinity of /q/

Subject	Vowel	Context	F1	F2
Damaris	/ɪ/ in [qɪspɪčɪ̲qʎay]	(iq)	494	2391
	/ɪ/ [qɪspɪkʊymanta]	(iq)	508	2466
	/ɪ/ in [hamurkankɪ]	(i)	406	2689
	/ɪ/ [yʊpayčamankɪkʊ]	(i)	427	2710
	/ʊ/ in [wɪʎamʊq]	(uq)	569	1016
	/ʊ/ in [hamurqankɪ]	(uq)	521	1077
	/ʊ/ [yʊpayčamaykɪkʊ]	(u)	468	1227
	/ʊ/ in [tʊ̲kʊy]	(u)	440	1178
Roberto	/ɪ/ in [nansɪ̲sqančɪis]	(iq)	373	2113
	/ɪ/ in [nʊqančɪ̲sɪɪ]	(i)	346	2579
	/ɪ/ in [nansɪsqančɪ̲s]	(i)	366	2676
	/ʊ/ [qʊnqaʎanmanta]	(uq)	447	836
	/ʊ/ in [nʊqančɪsɪɪ]	(uq)	474	914
	/ʊ/ in [tʊtʊka]	(u)	434	1187
	/ʊ/ in [kʊnʊnʊnʊy]	(u)	407	1098

Table 4.9 gives examples of isolated words in order to illustrate that there is relative backing and lowering of the vowels /ɪ/ and /ʊ/ in the vicinity of /q/. For example, Damaris backs and lowers the high vowel /ɪ/ in *qispichiqllay* (F1/F2: 494 / 2391) compared with the /ɪ/ in *hamurqanki* (F1/F2: 406 / 2689). The vowel /ʊ/ is also backed and lowered in *willamuq* (F1/F2: 569 / 1016) as compared with *tukuy* (F1/F2: 440 / 1178). The vowel context is signified by the symbols (iq) and (uq) to represent the vowels /ɪ/ and /ʊ/ in the vicinity of /q/ respectively.

Normalized data for Quechua-dominant bilingual speakers are shown in Figure 4.14. It is based on the results of five Quechua-dominant bilingual speakers. See Appendix D for list of vowels measured for Figure 4.14.

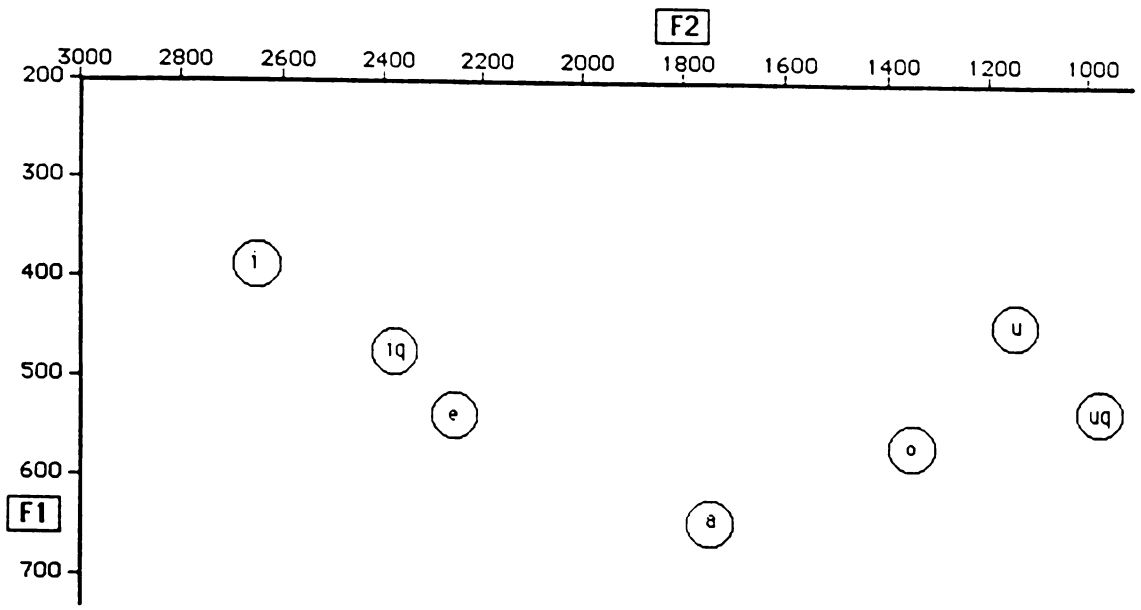


Figure 4.14: Quechua-Dominant Bilingual System (Normalized Data)

The allophonic rule involving the high vowels and [q] is clear from the data. T-test results show a significant difference between /ɪ/ and /ɪ/ in the vicinity of /q/ with (<.005) for both height and backness. The results for /ʊ/ and /ʊ/ in the vicinity of /q/ are (<.001) for both height and backness. There were only a couple of instances with borrowed [e] and [o], such as the word *espejo* 'mirror' which is found in a recited hymn. These did not group with the /q/-influenced allophones of /ɪ/ and /ʊ/ as they did in the monolingual Quechua system (Figure 4.6). T-test results between [e] and /ɪ/-/q/ were (<.001) for F1 and F2. There was no significant difference in height between /ʊ/-/q/ and [o] but there was a difference of (<.001) for vowel backness.

Figure 4.15 shows the standard deviation ranges for the normalized data presented in Figure 4.14. There is an average of 15 - 20 tokens for each vowel examined. See Appendix D for the complete listing of vowel tokens used in Figure 4.15. The standard deviations for each vowel are targeted in a small area within the acoustic space of Quechua-dominant bilinguals. Particularly interesting is that the high vowels /ɪ/ and /ʊ/ do not overlap with those high vowels that are in the vicinity of /q/.

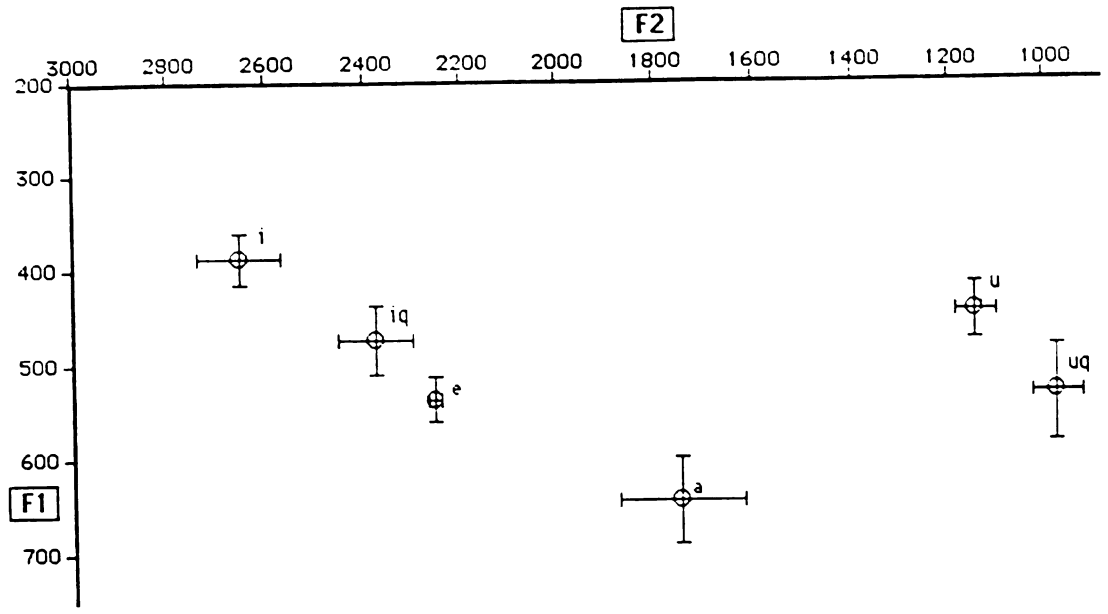


Fig. 4.15: Standard Deviations of Quechua-Dominant Bilingual Vowels

4.2 *Voice Onset Time*

The second research area involves the measurement of the voice onset time (VOT) of bilingual speakers in Quechua. The VOT is the amount of time between the release of a voiceless stop consonant and the beginning of voicing of the following vowel (Lisker and Abramson 1964:389). A zero value for VOT occurs when the release and voicing are simultaneous. VOT values can be classified as "short-lag" or "long-lag" based on the length of VOT. A VOT between 0 and 20 msec is considered a short-lag VOT, while a VOT longer than 40 msec is considered a long-lag VOT (Kewley-Port & Preston 1974; Lisker & Abramson 1964, 1971). Keating (1984:295) uses a slightly different range for determining

VOT lag-time. Short-lag VOTs are between 20-35 msec, depending on place of articulation. A velar stop, for example, would have a longer VOT than a bilabial stop. Long-lag VOTs would be any value over 35 msec. Generally, unaspirated voiceless stops have a shorter VOT than aspirated voiceless stops.

In this section, I will compare the VOT of /p, t, k/ in Spanish and Quechua. First, there will be a comparison between monolingual Spanish and monolingual Quechua speakers in order to establish a background of VOT lengths in Quechua. Second, the VOT of Quechua voiceless stops will be examined in bilingual speakers and compared with that of monolingual speakers to see if there is a significant difference in length due to contact with Spanish.

The hypothesis, as set forth in chapter 1 (see section 1.1.4.2), is that if Quechua has a long-lag VOT, then it will be shortened due to contact with Spanish, which has a short-lag VOT. As noted above, such results were found by Major (1992), who reported a shortening in the L1 VOT of bilingual speakers whose L2 is a short-lag VOT language.

4.2.1 *Spanish Voice Onset Time*

Spanish is an example of a language with short-lag VOT values for voiceless stops, /p, t, k/ (Flege 1988:346). Previous measurements of Spanish VOT have been conducted by Williams (1977), Flege and Eefting (1987), and Rosner *et al* (2000).

Rosner *et al* (2000) makes the case that VOT values in Spanish differ according to regional variety. They contrasted their data from Castilian Spanish with the data found by Williams (1977) from Latin American speakers.

TABLE 4.10: VOT of Voiceless Stops in Five Varieties of Spanish

Variety	Source	/p/	/t/	/k/
Guatamalan	Williams (1977)	9.8*	10.3	25.7
Venezuelan	Williams (1977)	14.0	20.6	32.6
Peruvian	Williams (1977)	15.2	16.2	29.7
Puerto Rican	Flege & Eefting (1987)	18	22	38
Castilian	Rosner *et al* (2000)	13.1	14.0	26.5

*VOT values in microseconds

The results shown in Table 4.10 establish a short-lag VOT for Spanish, i.e. no aspiration of voiceless consonants. These results are confirmed by measuring the VOT of monolingual Spanish speakers in the Urubamba speech community in Peru. The three monolingual Spanish speakers had average VOT values that corresponded with values in Table 4.10. Table 4.11 shows the VOT values for monolingual Urubamba Spanish speakers.

TABLE 4.11: VOT of Spanish Plain Stops in Three Peruvian Monolinguals

	/p/	n	/t/	n	/k/	n
Marcelo	16.3*	6	18.8	17	35.6	6
Pedro	13.1	9	17.6	19	31.3	10
Teresa	16.1	6	21.5	11	34.3	9
Mean:	**15.2**		**19.3**		**33.7**	
Std. Dev.	1.79		2.00		2.21	

*VOT values in microseconds

The monolingual Spanish speakers of the Urubamba speech community show VOT values for /p,t,k/ that correspond to those found in Table 4.10. Specifically, data in Table 4.11 corresponds to data found by Williams (1977).

4.2.2 *Quechua Voice Onset Time*

There have been no studies that I am aware of that measure Quechua VOT of voiceless consonants. It has been established by Andean dialectologists that in the Cusco variety of Quechua, there is a 3-way distinction in voiceless stops -- plain, aspirated, and glottalized (e.g., Wölck 1987:72). The following data are from monolingual Cusco Quechua speakers for /p, t, k/.

TABLE 4.12: VOT of Quechua Plain Stops of Monolingual Quechua Speakers

	/p/	n	/t/	n	/k/	n
Florencia	22.4*	9	25.75	8	43.5	12
Jaime	17.0	10	25.1	14	42.2	13
Mercedes	18.25	8	20.3	6	43.0	10
Pilar	17.5	13	25.8	5	40.6	10
Mean:	**18.78**		**24.2**		**42.32**	
Std. Dev.	2.46		2.64		1.27	

*VOT values in microseconds

When comparing the VOT of /p,t,k/ between monolingual Spanish and monolingual Quechua speakers, we find that there are significant differences in average VOT for /t/ and /k/, but not for /p/. Table 4.13 presents t-tests that compare the VOTs of monolingual Quechua and monolingual Spanish speakers.

TABLE 4.13: Comparison of VOT between Monolingual speakers of Spanish and Quechua

/p/	t = -2.14	SD = 2.22	P = *n.s.*
/t/	t = -2.69	SD = 2.41	P = < .05
/k/	t = -6.59	SD = 1.71	P = < .001

There is a significant difference (< .05) that distinguishes the VOT of /t/ between groups of monolingual speakers. Monolingual Spanish has a mean of 19.3 msec for /t/ and monolingual Quechua has a mean of 24.2 msec. There is an even greater difference between the two groups for the VOT of /k/ (< .001). Monolingual Spanish VOT is 33.7 msec for /k/ while monolingual Quechua has the mean of 42.32 msec for /k/. While there is not a significant difference between VOT lengths of /p/ in these two groups of speakers, the VOT for monolingual Spanish speakers, 15.2 msec, is shorter than that of monolingual Quechua speakers, 18.78.

4.2.3 *Quechua-Spanish Bilingual Speakers' Voice Onset Time*

In the Urubamba speech community, the VOT values for /t/ and /k/ are shorter in the speech of monolingual Spanish speakers than they are in monolingual Quechua speakers. I have hypothesized that this will shorten the VOT of /t/ and /k/ in bilingual speakers. Tables 4.14 and 4.15 present the measurements of VOT of /p, t, k/ for Quechua-dominant and Spanish-dominant bilinguals respectively. If we compare the results between the two groups of bilingual speakers, we will find some differences. Table 4.16 presents the statistical significance of VOT for both groups of bilingual speakers. When we compare the VOT values we find significant differences for /p/ and /k/, but not /t/.

TABLE 4.14: VOTs of Quechua plain stops of Quechua-Dominant bilingual speakers*

Name	/p/	N	/t/	n	/k/	n
Adelaida	17.8	10	19.7	10	37.25	12
Bernabè	17.1	10	21.1	10	35.75	12
Edgar	18.4	14	23.6	9	35.3	12
Irene	18.2	9	20.7	7	34.6	10
Luis	17.3	12	22.0	12	34.3	10
Magdelana	18.3	11	23.6	8	38.0	11
Mariza	19.0	9	21.75	8	35.2	11
Roberto	20.1	7	23.1	7	34.7	10
Mean:	18.27		21.9		35.6	
Std. Dev.	0.959		1.42		1.32	

TABLE 4.15 VOTs of Quechua Plain Stops of Spanish-Dominant Bilingual Speakers

Name	/p/	N	/t/	n	/k/	n
Alejandro	15.0	14	22.2	10	31.8	15
Dolores	16.5	10	23.12	8	34.5	13
Einar	17.8	11	21.3	8	34.1	13
Esteban	15.5	14	20.0	11	32.87	16
Jemima	16.9	11	20.6	9	35.2	11
Lucha	18.2	10	23.5	10	34.6	11
Maria	17.4	13	20.7	7	34.4	12
Mean:	16.8		21.6		33.9	
Std. Dev.	1.18		1.34		1.18	

TABLE 4.16: Comparison of VOTs for both Groups of Bilingual Speakers

/p/	t = 2.75	SD = 1.07	P = < .01
/t/	t = 0.436	SD = 1.38	P = *n.s.*
/k/	t = 2.63	SD = 1.26	P = < .05

TABLE 4.17: Mean VOTs for Monolingual and Bilingual Speakers

	Quechua Monolinguals	Bilingual: Quechua-dominant	Bilingual: Spanish-dominant	Spanish Monolinguals
/p/	18.78	18.27	16.8	15.2
/t/	24.2	21.9	21.6	19.3
/k/	42.32	35.6	33.9	33.7

If we compare the VOT of /p, t, k/ of bilingual speakers with that of monolingual speakers, we find that there may be some influence from Spanish. The mean VOT of bilingual speakers and monolingual speakers for /p/, /t/ and /k/ are compared in Table 4.17. The VOT for these phones are different between monolingual Spanish and monolingual Quechua speakers.

The mean VOT for all three phones in bilingual speakers are shorter than those found in monolingual Quechua speakers. The mean VOTs of each phone form a continuum with monolingual speakers at each end, the Quechua-dominant bilinguals closer to the monolingual Quechua speakers, and the Spanish-dominant bilinguals closer to the monolingual Spanish speakers.

4.3 *Phonemic Merger In Quechua Bilingual Speakers?*

This final research area aims to see if phonemic distinctions are maintained in an L1 (Quechua) that is in contact with an L2 that has a different phonological system (Spanish). The prediction stated in section 1.2 was that level of bilingual proficiency would be a predictor of the degree of merger (or near-merger). The Spanish-dominant bilingual is expected to have less aspiration and glottalization. The loss of the uvular stop /q/ is also thought to be more likely in the Quechua of Spanish-dominant bilinguals.

4.3.1 *Areas for potential merger in Quechua*

The first topic of this part of the study is the three-way distinction of voiceless stops (plain, aspirated, and glottalized) that occurs in the Cusco variety of Quechua. Spanish only has the plain voiceless stop. The second topic is the contrast at the velar and uvular places of articulation in Quechua. It is uncommon for a language to have a phonemic contrast at the velar and uvular places of articulation and even more unusual to have a three-way contrast at the palatal, velar, and uvular locations, such as the contrast found in Quechua (Laver 1994:207). Spanish, on the other hand, only has a velar /k/ stop. The question is whether the velar and uvular phonemes merge in the Quechua of bilingual speakers in contact with Spanish.

4.3.2 *Aspiration and Glottalization*

Aspiration and glottalization are at the opposite ends of the spectrum in terms of glottal closure. Ladefoged and Maddieson (1996:69) define aspiration as "a period after the release of a stricture and before the start of regular voicing, (or the start of another segment, or the completion of an utterance) in which the vocal folds are markedly further apart than they are in modally voiced sounds." Glottalization, on the other hand, is when there is full closure of the vocal folds, such as in the glottal stop (Ladefoged and Maddieson 1996:73). If phonemic merger occurred in bilingual speakers, then we would find the loss of aspiration and glottalization in the Quechua of those bilingual speakers.

4.3.2.1 *Aspiration of Quechua /p^h, t^h, k^h, q^h/ in Bilingual Speakers*

Voiceless aspirated stops, /p^h, t^h, k^h, q^h/ are distinguished from plain voiceless stops /p, t, k,q/ in terms of VOT. Plain stops have shorter VOTs while aspirated stops have longer VOTs. Tables 4.18 and 4.19 present the VOTs of plain and aspirated voiceless stops in Quechua-dominant and Spanish-dominant bilinguals respectively.

TABLE 4.18: VOTs of Plain and Aspirated Voiceless Stops of Quechua-Dom. Bilinguals

	Mean VOT	n	t	SD	P
/p/	18.2	79			
/p^h/	40.9	21	- 30.0	3.08	< .001
/t/	22.1	68			
/t^h/	53.1	7	- 21.3	3.68	< .001
/k/	35.6	89			
/k^h/	76.1	21	- 39.4	4.24	< .001
/q/	37.7	32			
/q^h/	71.0	30	- 22.4	5.86	< .001

TABLE 4.19: VOTs of Plain and Aspirated Voiceless Stops of Spanish-Dom. Bilinguals

	Mean VOT	n	t	SD	P
/p/	16.7	84			
/p^h/	30.5	14	- 16.0	2.93	< .001
/t/	21.7	64			
/t^h/	48.0	7	- 22.9	2.89	< .001
/k/	33.7	87			
/k^h/	49.2	14	- 15.2	3.54	< .001
/q/	37.8	16			
/q^h/	59.7	18	- 13.1	4.88	< .001

For each pair of plain and aspirated phones, each mean VOT is compared. In each case we find a significant difference between the means of the VOT of plain and aspirated phones in both Quechua-dominant and Spanish-dominant bilinguals. Therefore, aspiration is maintained in the speech of bilingual speakers.

Three of the four VOTs of Spanish-dominant and Quechua-dominant bilinguals are significantly different. Table 4.20 shows the comparison between Quechua-dominant and Spanish-dominant bilingual speakers in terms of the VOT of / p^h, t^h, k^h, q^h/.

TABLE 4.20: Comparison of VOT of Voiceless Aspirated Stops in Bilingual Speakers

	Quechua-Dominant	Spanish-Dominant	
/p^h/	40.9	30.5	P = < .001
/t^h/	53.1	48.0	*n.s.*
/k^h/	76.1	49.2	P = < .001
/q^h/	71.0	59.7	P = <.001

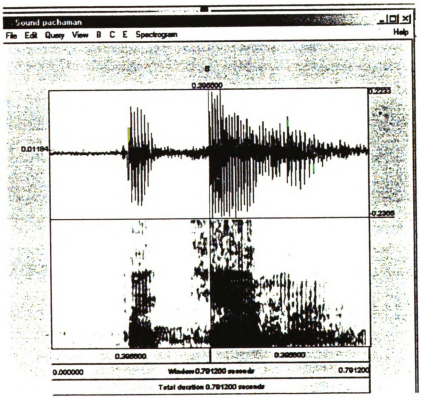
Aspiration between bilingual speakers is significantly different for / p^h, k^h, q^h/. In each case, the VOT was shorter for Spanish-dominant bilinguals than for Quechua-dominant bilinguals. The VOT for /t^h/ was found to be shorter in Spanish-dominant bilinguals, but not statistically significant.

While aspiration is maintained phonemically in the speech of bilingual speakers of Quechua, knowledge of Spanish does seem to have the effect of shortening the VOT of aspirated stops in Spanish-dominant bilinguals. This corresponds to the results of Major (1992) reported above. Recall that he found a shorter VOT in the aspirated voiceless stops of native English speakers that were bilingual speakers of Portuguese. Both Major (1992) and the present study, therefore, provide evidence of reverse transfer in relation to voice onset time.

4.3.2.2 *Glottalization of Quechua /p', t', k', q'/ in Bilingual Speakers*

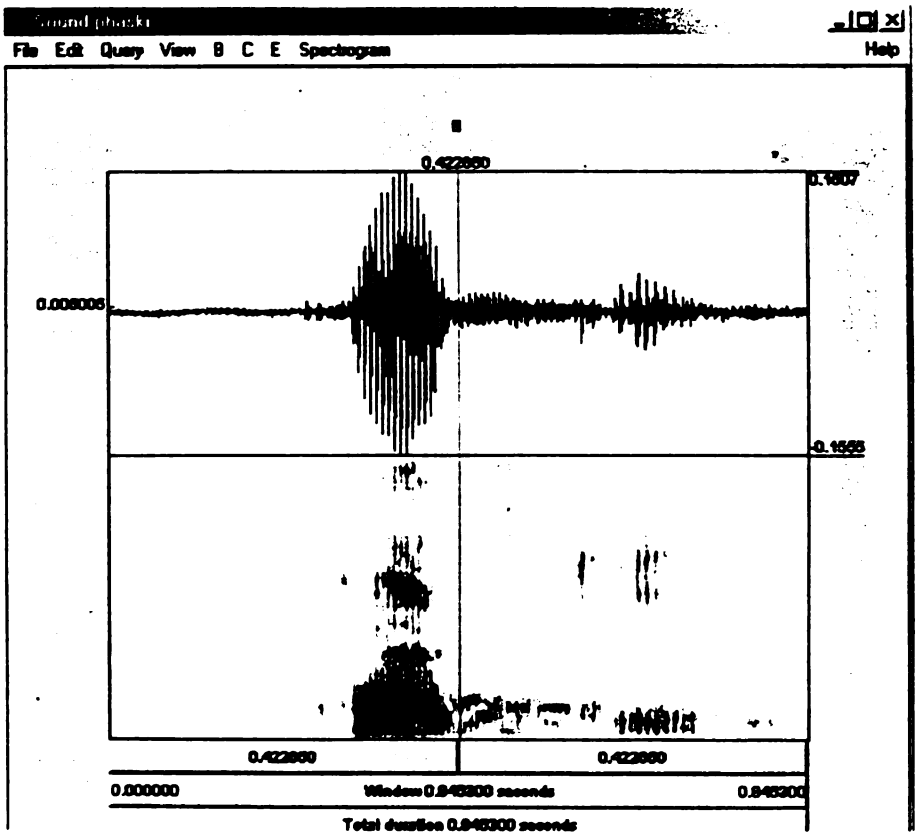
Ladefoged and Maddieson (1996:74) explain the difference between voiceless glottal stops, /p', t', k', q'/ and plain voiceless stops, /p, t, k, q/ as follows: "both stop series have a brief delay of voice onset after the release of the oral closure, but whereas this is filled with an acoustically noisy interval in the simple stop series, there is essentially silence between the oral release of a 'glottalized' stop and the beginning of voicing for the following vowel."

The difference between /p/, /p^h/, and /p'/ can be shown with a spectrogram. The following three spectrograms show the words *pachaman*, *phaski* and *p'acha* as spoken by Spanish-dominant bilingual speaker Einar.



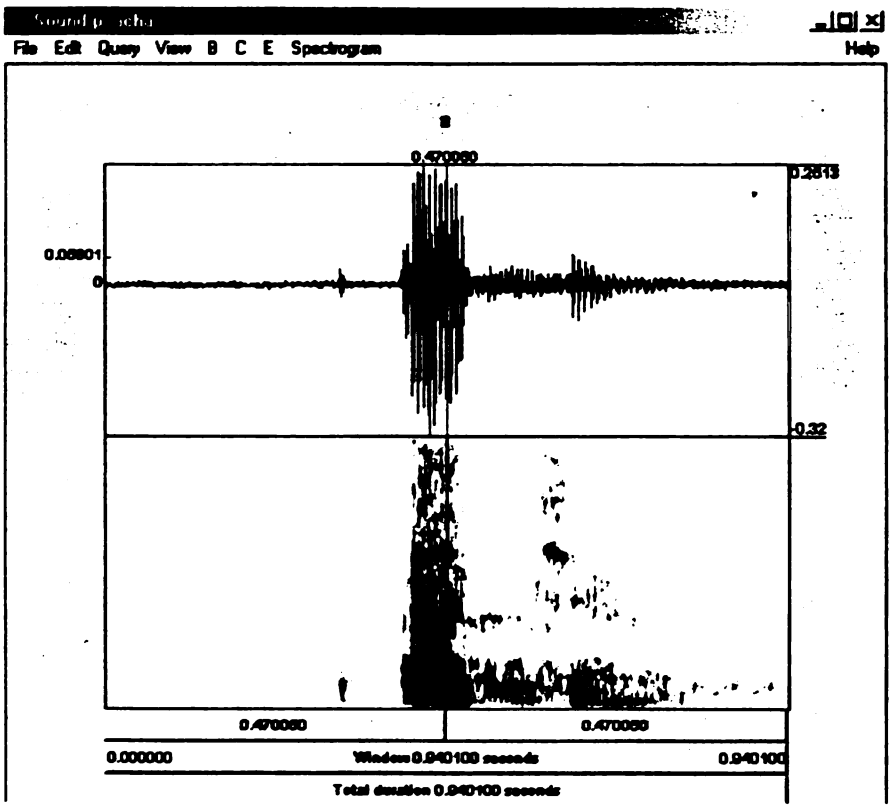
[pa ča ma n]

Fig. 4.16: Spectrogram of *pachaman*



[p^h a s k i]

Fig 4.17: Spectrogram of *phaski*



[p' a č a]

Fig. 4.18: Spectrogram of *p'acha*

Figure 4.16 shows a word with the plain stop /p/. There is a short VOT at the beginning of the word. The word *phaski* is shown in Figure 4.17. The /p^h/ has a longer VOT than the plain stop. The last word, in Figure 4.18, contained a glottalized stop, /p'/. The spectrogram shows the initial burst and a longer VOT than even the aspirated stop. When all bilingual speakers are analyzed, all maintain the use of the glottal stop. Table 4.21 shows a random sample of glottallized stops in eight Quechua-dominant bilinguals and eight Spanish-dominant bilinguals. The first number shows how many times a particular glottallized stop occurred, and the second number is the amount of words with that glottallized stop.

TABLE 4.21: Comparison of Glottallized Stops in Bilingual Speakers

	Quechua-Dominant	Spanish-Dominant
/p'/	16/23 69%	15/23 65%
/t'/	21/30 70%	23/30 76%
/k'/	21/24 87%	17/21 81%
/q'/	34/37 92%	32/39 82%

In short, both aspiration and glottalization are maintained in bilingual speakers. Therefore, in these two cases, there is no evidence for a phonemic merger,

although there seems to be influence on the length of Quechua VOT in the aspirated stops of bilinguals.

4.3.3 *Uvular /q/ and velar /k/*

The final question is whether bilingual speakers merge uvular /q/ and velar /k/ resulting in a Quechua system in which the velar stop is used instead of the uvular /q/ because of Spanish influence. Since /k/ and /q/ are phonemic, there should be an audible difference between them, but the experience that I have had with Quechua has been insufficient for me to hear a consistent and reliable difference between /k/ and /q/ in Quechua speakers.

There are only a few acoustic studies completed on the difference between velar and uvular stops (Al-Ani 1970, Ladefoged and Maddieson 1996:36). One of the ways in which velar and uvular phones are distinguished is in the F2 of the following [a] or [i] vowel. Al-Ani (1970) examined the velar and uvular stops in Arabic and found that after a uvular stop, the F2 lowers for the following [a] or [i]. Ladefoged and Maddieson (1996:36) analyzed twelve speakers of K'ekchi and found, for nine of the twelve speakers, the F2 was lower for [a] and [i] after a uvular consonant.

Tables 4.22 and 4.23 examine the F2s for [a] and [ɪ] following velar and uvular phones in Quechua-dominant and Spanish-dominant bilinguals respectively. We find that all the Quechua-dominant bilinguals have vowel backing after the

uvular consonant. The most common occurs with the [ɪ] vowel. This corresponds with the allophonic rule in Quechua which backs and lowers the front high vowel [ɪ] in the vicinity of /q/. In Spanish-dominant bilinguals the backing of [ɪ] following a uvular consonant is less likely to occur. This corresponds with earlier results that showed that the allophonic rule in Quechua is less likely to occur in Spanish-dominant bilinguals (cf. section 4.1.3.2). In ten of the twelve speakers there seems to be no significant difference in the F2 of [a] following a uvular consonant. This does not seem to follow the results of Al-Ani (1970) and Ladefoged and Maddieson (1996).

TABLE 4.22 Comparison of F2 for [ɪ] and [a] after [k] and [q] for Que-Dom Bilinguals

	Velar F2 mean	Uvular F2 mean	P
Adelaida	**[a] 1745**	**[a] 1779**	***n.s.***
	[ɪ] 2637	**[ɪ] 2209**	**< .01**
Bernabè	[a] 1668	[a] 1463	*n.s.*
	[ɪ] 2213	[ɪ] 1924	< .01
Edgar	**[a] 1813**	**[a] 1786**	***n.s.***
	[ɪ] 2611	**[ɪ] 2128**	**< .001**
Irene	[a] 1651	[a] 1731	*n.s.*
	[ɪ] 2754	[ɪ] 2197	< .01
Magdalena	**[a] 1727**	**[a] 1642**	***n.s.***
	[ɪ] 2496	**[ɪ] 2387**	**< .05**
Roberto	[a] 1707	[a] 1517	< .005
	[ɪ] 2429	[ɪ] 2071	< .005

TABLE 4.23: Comparison of F2 for [ɪ] and [a] after [k] and [q] for Spn-Dom Bilinguals

	Velar F2 mean	Uvular F2 mean	P
Alejandro	**[a] 1499**	**[a] 1462**	***n.s.***
	[ɪ] 2037	**[ɪ] 1872**	**< .01**
Dolores	[a] 1667	[a] 1666	*n.s.*
	[ɪ] 2682	[ɪ] 2578	< .05
Einar	**[a] 1528**	**[a] 1598**	***n.s.***
	[ɪ] 2361	**[ɪ] 2121**	***n.s.***
Jemima	[a] 1707	[a] 1750	*n.s.*
	[ɪ] 2574	[ɪ] 2553	*n.s.*
Laura	**[a] 1763**	**[a] 1727**	***n.s.***
	[ɪ] 2609	**[ɪ] 2552**	***n.s.***
Lorena	[a] 1937	[a] 1836	< .05
	[ɪ] 2444	[ɪ] 2403	*n.s.*

There may be an articulatory reason why [ɪ] is statistically more likely to be backed than [a]. There is more articulatory space for [ɪ] to move and still be perceived as /ɪ/. The phone [a] has less area to move since it is in the lower part of the articulatory space.

In the Arabic data presented by Al-Ani (1970:32-33) the F2 for [a] lowers from 2250 after [k] to 1600 after [q]. For the vowel [ɪ], the F2 is 1500 after [k] and 1200 after [q]. In terms of actual acoustic space, the [ɪ] has more space to move than [a]. In the data presented in Table 4.16, the F2 for [a] and [ɪ] are lower when following a uvular stop than a velar stop in 22 of 24 pairs. However, the difference in F2 is in most cases not significant.

The lowering of F2 of /ɪ/ after a uvular stop resembles the allophonic rule in Quechua that backs and lowers the high vowels when in vicinity of a uvular stop. This raises the question of whether the rule, in part, is the result of a tendency for [ɪ] to have a lower F2 after a uvular stop. The situation in Quechua is different, however, in that the allophonic rule involves both high vowels [ɪ] and [u] and they tend to be lower and well as backed.

Chapter 5

CONCLUSIONS

5.0 *Summary of Study and Relation to Hypotheses*

This study has examined reverse transfer in Quechua as a result of contact with Spanish. The specific area studied is influence on the phonetic and phonological levels in the Quechua of bilingual speakers. Within these levels, this study specifically explored four areas in the Quechua of bilingual speakers: the position of high vowels /ɪ/ and /ʊ/, the voice onset time of plain stops /p, t, k/, the existence of aspiration and glottalization, and the existence of the uvular phoneme.

First, it was shown that in bilingual speakers the high vowels /ɪ, ʊ/ in Quechua were raised to the range of high vowels in Spanish. Bilingual speakers were found to pronounce Quechua words containing /ɪ/ and /ʊ/ closer to the Spanish range for high vowels than to the monolingual Quechua range. These results revealed that the formant frequencies of high vowels for bilingual speakers are closer to the monolingual Spanish system rather than the monolingual Quechua system. It can be concluded that this raising is due to influence from Spanish in bilingual speakers.

Second, the voice-onset times of monolingual Spanish and monolingual Quechua /p, t, k/ were compared. It was found that the voice onset times for /t/ and /k/ were significantly longer in Quechua than in Spanish, although bilingual

speakers had a mean VOT for /k/ in Quechua that was not significantly different from monolingual Spanish speakers. The mean values for /t/ in Quechua for bilinguals were shorter than those of monolingual Quechua speakers, but not significantly different. The results seem to indicate that the shorter VOT in Spanish has caused the VOT of voiceless stops of bilinguals to shorten. This confirmed the hypothesis that the VOT of Quechua phones would be shorter in bilingual speakers. Further confirmation was found in the measurement of VOT for aspirated phones in Quechua. The VOT for /p^h, k^h, q^h/ in Quechua was shown to be significantly different between Spanish-dominant and Quechua-dominant bilingual speakers. The VOT for /t^h/ was shorter in Spanish-dominant bilinguals as well, yet not statistically significant.

Third, the presence of aspiration and glottalization was explored in bilingual speakers when speaking Quechua. Both aspiration and glottalization were found in bilingual speakers, suggesting that aspiration and glottalization are maintained phonemically for both Quechua-dominant and Spanish-dominant bilingual speakers, but there does seem to be reverse transfer which is reflected in the shorter VOT of /p^h, k^h, q^h/ in Spanish-dominant bilingual speakers. The hypothesis that aspiration and glottalization would remain in bilingual speech has been confirmed.

Fourth, the presence of the uvular phoneme was explored. I was not able to audibly distinguish between [k] and [q], so an acoustic analysis was tried. Measurements were made of the F2 of [a] and [i] which follow velar and uvular

consonants. Al-Ani (1970) and Ladefoged and Maddieson (1996:36) found that the F2 of [a] and [ɪ] were lower after a uvular than after a velar. The results in this study are unclear. In the case of Quechua-dominant bilinguals, everyone showed vowel backing after a uvular /q/. The most common occurrence was after the vowel [ɪ]. Even three out of the six Spanish-dominant bilingual speakers showed evidence of the backing of the vowels after a uvular /q/. The rest showed no significance between the F2 of [a] and [ɪ] following a velar or a uvular. It is unclear whether a merger has occurred in Spanish-dominant bilinguals. I believe that more research needs to be done concerning the acoustic difference between uvular and velar phones.

The last two hypotheses dealt with the issue of phonemic merger in a first language as the result of a contact situation. My hypothesis was that there would be less aspiration and glottalization in Spanish-dominant bilinguals than in Quechua-dominant bilinguals. The loss of the uvular stop [q] was also predicted to more likely occur in Spanish-dominant bilinguals.

Phonemic distinctions seem to be maintained despite influence from L2. Actually, aspiration and glottalization seem to distinguish the Cusco variety of Quechua from the other varieties of Quechua. Cusco is considered the prestige variety. Possibly the maintenance of aspiration and glottalization are due to social reasons and the prestige the Cusco variety has among the speakers of Urubamba.

A general hypothesis of Chapter One was that there would be greater influence to the Spanish-dominant Quechua system than the Quechua-dominant system due to reverse transfer. It has been shown that at each instance of potential influence there is a difference between Quechua-dominant and Spanish-dominant bilingual speakers. The Spanish-dominant bilingual speakers have a Quechua system intermediate to that of Quechua-speaking and Spanish-speaking monolinguals.

Differences between Spanish-dominant and Quechua-dominant bilingual speakers are clearly seen in the area of vowel positioning in Quechua. Spanish-dominant bilingual speakers do not apply an allophonic rule which backs the high vowels when in the vicinity of the uvular /q/. All Quechua-dominant bilinguals apply this allophonic rule. This is presumably a reflection of Spanish influence since such a rule does not exist in Spanish. Another area that shows the difference between groups of bilingual speakers is voice onset time. Even though aspiration is maintained in the Quechua of Spanish-dominant bilinguals, their aspiration of /p^h, k^h, q^h/ is less than that of Quechua-dominant bilingual speakers.

The results of this study support the idea that bilingual speakers construct an interlanguage that is comprised of both the native language and the target language. If we look at interlanguage as a continuum, then we could classify Quechua-dominant bilinguals as falling somewhere between incipient bilingual speakers and Spanish-dominant bilingual speakers.

The results also relate to previous work done on Spanish-Quechua bilingualism in Peru. Escobar (1976) and Wölck (1972, 1988) hypothesized that advanced

bilingual speakers, such as the Spanish-dominant bilinguals in Urubamba, would exhibit reverse transfer in Quechua as a result of contact with Spanish. Escobar (1976:91) hypothesized that one could speak of a "degree of fusion" in advanced bilingual speakers where both languages influence each other.

5.1 Recommendations for further study

It is recommended that studies dealing with reverse transfer be done in other speech communities of Quechua speakers in Peru. Other situations may lead to different examples of influence. For example, a bilingual speaker in a Spanish dominant area such as Cusco or Lima may have greater influence from Spanish on their interlanguage. Phonemic merger may occur in the areas that were researched here involving aspiration, glottalization, and the uvular phoneme.

The study of words borrowed into Quechua from Spanish is of particular interest. There were a few instances of words with Spanish [e] and [o] and we were able to see where these tokens were placed in the vowel system in relation to the Quechua phonemes /ɪ/ and /ʊ/. Further studies in this area should include words borrowed from Spanish that have the vowels [e] and [o].

More acoustic research needs to be done regarding the difference between the velar and uvular phone in languages that have both. Al-Ani (1970) and Ladefoged and Maddieson (1996) have only briefly touched on this area and more research would be beneficial.

Another area that could be expanded in future research is in the area of reverse transfer. Most of the literature on language contact and change has dealt with substratum transfer, yet there is so much more to learn about the effects that a second language could have on a first language in a bilingual speaker. In addition to studies in phonetics and phonology, other levels of language such as morphology, syntax, semantics, discourse, and pragmatics should be explored.

APPENDICES

APPENDIX A
Spanish Word List

(1) banco	[baŋko]	'bank'
(2) bebe	[beβe]	'baby'
(3) biblia	[biblia]	'Bible'
(4) bonito	[bonito]	'pretty'
(5) burro	[burro]	'donkey'
(6) dama	[dama]	'lady'
(7) debajo	[deβaho]	'underneath'
(8) dicho	[dičo]	'I say'
(9) domingo	[domiŋgo]	'Sunday'
(10) duda	[duδa]	'doubt'
(11) gana	[gana]	'desire'
(12) gente	[γente]	'people'
(13) giro	[γiro]	'turn'
(14) gordo	[gorδo]	'fat'
(15) gusto	[gusto]	'taste'
(16) kilo	[kilo]	'kilo'
(17) paseo	[paseo]	'avenue'
(18) pelo	[pelo]	'hair'
(19) piloto	[piloto]	'pilot'
(20) poco	[poko]	'little'
(21) punto	[punto]	'point'
(22) taza	[tasa]	'cup'
(23) techo	[tečo]	'roof'
(24) tipo	[tipo]	'type'
(25) toro	[toro]	'bull'
(26) tutor	[tutor]	'tutor'

APPENDIX B
Quechua Word List

(1) chaki	[čakɪ]	"leg"
(2) chhapu	[č^{h}apʊ]	"frayed border"
(3) ch'aqi	[č'aqɪ]	"soup"
(4) kanka	[kanka]	"roast"
(5) kiru	[kɪrʊ]	"teeth"
(6) kunka	[kʊnka]	"neck"
(7) khamuy	[k^{h}amʊy]	"come"
(8) khishka	[k^{h}ɪška]	"thorn"
(9) khuchi	[k^{h}ʊčɪ]	"pig"
(10) k'acha	[k'ača]	"beautiful"
(11) k'isku	[k'ɪskʊ]	"narrow"
(12) k'ullu	[k'ʊλʊ]	"wood"
(13) pachaman	[pačaman]	"to the earth"
(14) pichi	[pɪčɪ]	"cat"
(15) piluta	[pɪlʊta]	"ball"
(16) puka	[pʊka]	"red"
(17) phaski	[p^{h}askɪ]	"moist"
(18) phiri	[p^{h}ɪrɪ]	"wheat meal"
(19) phutisqa	[p^{h}ʊtɪsqa]	"sad"
(20) punku	[pʊnkʊ]	"door"
(21) p'acha	[p'ača]	"clothes"
(22) p'itay	[p'ɪtay]	"to jump"
(23) p'utuy	[p'ʊtʊy]	"to come out"
(24) qanmi	[qanmɪ]	"your"
(25) qilla	[qɪλa]	"laziness"
(26) qispichiqta	[qɪspɪčɪqta]	"he that saves"
(27) qispikuyta	[qɪspɪkʊyta]	"salvation"
(28) qucha	[qʊča]	"lake"
(29) qupushani	[qʊpʊšanɪ]	"I'm giving it to you"
(30) qusunki	[qʊsʊnkɪ]	"he/she will give you"
(31) qhapaq	[q^{h}apaq]	"wealthy"

(32) qhilli	[qʰɪλɪ]	"dirty"
(33) qhipataqa	[qʰɪpataqa]	"behind, after"
(34) qhucha	[qʰʊča]	"lake"
(35) qhuya	[qʰʊya]	"mine"
(36) q'aya	[q'aya]	"next"
(37) q'illu	[q'ɪλʊ]	"yellow"
(38) q'ipi	[q'ɪpa]	"luggage"
(39) q'umir	[q'ʊmɪr]	"green"
(40) q'upa	[q'ʊpa]	"garbage"
(41) tamya	[tamya]	"storm"
(42) tarinkichu	[tarɪnkɪčʊ]	"have you found?"
(43) tika	[tɪka]	"adobe"
(44) tura	[tʊra]	"brother"
(45) tutapas	[tʊtapas]	"night"
(46) thanpi	[tʰanpɪ]	"insecure"
(47) t'akarimuwayku	[t'akarɪmʊwaykʊ]	"plant us"
(48) t'ika	[t'ɪka]	"flower"
(49) t'inpu	[t'inpʊ]	"boiled"
(50) t'uru	[t'ʊrʊ]	"mud"

APPENDIX C
Quechua Hymns

Quechua hymns taken from: *Diosman Pusakuq Takikuna.* 1st edition. Cusco, Peru: Asociacion Regional de Iglesias del Sur Peruano. 1993. All hymns translated into English by Timothy and Barbara Whatley, July 1999 except for #5 and #53..

1) Hymn #2

Señor Diosnillay kamaqllay	My Lord, God and Creator
Qanmi kanki tukuy unanchaq	you are a banner of truth.
Chanin runaq taytallayku	You are every man's father
Chaymi yupaychamuykiku	therefore we worship you.
Señor Jesusllay qespichiqllay	My Lord Jesus, My savior
Hamurqanki hallpa pachaman	you came to this earth
qespikuymanta willamuq	to tell of salvation,
Sumaq kawsay qonaykipaq	to give us a good life.
Ch'ulla kaq Espiritullay	You are my Holy Spirit
Qelqayki runa kusichiq	your book makes man happy
Kallpachaykunakullasun	it strengthens us
Chaymi yupaychamuykiku	therefore we adore you.
Munasqay turay ñañallay	My beloved brother, sister
Yupaychasun kay hinata	let's adore this living,
Kinsantinku huklla kanku	three-in-one
Llapa kawsaq allinninpaq.	all good (God).

2) Hymn #5

Munakusqay runamasiy
Munakusqay wayqepanay
Munakuypi kawsasunchis
Cristowanña kasun hina.

Sonqoytapas Diosman qoni
Almay cuerpon qopushani
Sonqollaypi tiyananpaq
Wiñay wiñay kawsananpaq.

Kutrimuy runamasi
Almaykiqa sayk'upushan
Jesucristo samachinqa
Kawsaytapas qoykuspaña.

Adorsun yupaychasun
Qespichiqta adorasun
Hatunchasqa kanallanpaq
paytapuni yupaychasun.

3) Hymn # 7

Dios Yayata Yupaychasun	Let's adore our great Father God
Sumaq munakuyninmanta	for His love
Churin Jesucristomanta	and His son Jesus Christ,
Sumaq Qespichhikuqmanta	the good savior.
Jesusllata yupaychasun	Let's adore Jesus
Yawarnin hich'asqanmanta.	for spilling His blood.
Chay sumaq yawarninwanmi	With His precious blood
Millay huchanchista mayllin	He washes our filthy sin.
Espirituta yupaychasun	Let's adore the Holy Spirit
Kallpanchawasqanchismanta.	for strengthening us.
Wat'eqaypi kaqtinchispas	In the midst of temptation
Payllan yanapaykuwanchis	He helps us.

Llaki muyuwaqtinchispas	When we suffer in sadness
Payllan kuskuchiwanchis.	He makes us happy.

4) Hymn #10

Diospa siminqa sinchi sumaqmi	God's word is very good.
Llamp'u siminwan rimaykuwanchis	with it's soft words it tells us
Mosoq kawsayta purinanchispaq	to walk in new life
Allin yuyaywan kawsananchispaq	to live with a good conscience.
Diospa siminqa rimawanchismi	God's word tells us
Ama kaychischu uyariqllaqa	that if we don't do what we hear
Kikiykichista q'otokuspaqa	we're deceiving ourselves rather
Aswanpas simin hunt'aqllapuni	we should always fulfill His word
Munakusqallay tura ñañallay	My beloved brother, sister
Chaninllapunin Diospa siminqa	fear God's true
Manchay sumaqta rimaykuwanchis	and very good word.
Sumaq kawsayta rikuchiwanchis	He tells us how to live right.
Diospa siminqa espejo hinan	God's word is like a mirror
Rikuchiwanchis huchallanchista	it shows us our sin
k'umuykukuspa kawsananchispaq	so we can live
Allin yuyaywan purinanchispaq	so we can have a pure conscience.
Munakusqallay tura ñañallay	My beloved brother, sister
Chanillanpunin Diospa siminqa	God's true word
Kasukullayña waqyakuyninta	come my child.

5) Hymn #16

Hanaq pacha llaqtamanta	From heaven above
Señor Jesus waqyakamun	the Lord Jesus calls.
Uyarikuy runamasiy	Listen, my fellow man
Diosninchispa simillanta.	To our God's word.
Kay pachapi tukuy runa	Everyone in this world
Huchallanpa atipasqan	that has sinned
Almallantin ñak'arinqa	his soul will suffer
Infiernoman haykuqkuspa	upon arriving to Hell.
Hanaq pacha llaqtapitaq	In Heaven's town
Hanqaq pacha suyupitaq	In Heaven's region
Dioswan kuska tiyakuymi	to dwell together with God
Dioswankuska kawsakuymi.	to live together with God.

6) Hymn #21

Señorniypaqmi ñoqa llank'asaq,	For my Lord, I will work,
Simillanmanta lliwman willasaq;	Only of His word to all I will speak;
Sutinmanta takisaq,	I will sing about His name,
Munakuq qespichiqpaq,	So they can be saved by the one who loves,
Chay sumaq llank'ananpi.	In His good (sweet) work.
Llank'asaq, llank'asaq,	I will work, I will work,
Señorniypa chay sumaq llank'ananpi,	In my Lord's good work,
Mañakuytan munani,	I want to be asked to be placed,
Kawsayninta churaspa	in His Life.
Chay sumaq llank'ananpi.	In His good (sweet) work.
Señorpaq sapa p'unchay llank'saq,	I will work for the Lord every day,

Lliw chinkasqata Diosman pusaspa,	leading all the lost to God.
Jesusmantaq pusaspa,	And to Jesus I will lead them,
Munakuq qespichiqman,	to the one who saves,
Chay sumaq llank'ananpi,	In His good (sweet) work.
Señormi ñoqaq kallpachaykuqniy;	I will trust in my Lord;
Lliw atiyninpi suyakusaq.	I will wait in His power.
Kashanraqmi llank'ana	There is yet work
Llapan Pay serviqpaqqa,	for all who serve Him,
Chay sumaq llank'ananpi.	In His good (sweet) work.

7) Hymn #51

Wayqe panay	Brothers and sisters
Kallpanchakuy	be strengthened
Cristowan riyta.	to walk with Christ.
Diosniyqa kunan	God will soon
Kutimunqañan	return to fulfill
Siminman hinan	what He said.
Hunt'aykushanña.	
Jesusqa ninmi	Jesus said
Kutimuspayqa	"Returning
Wawaykunatan	I will take my children
Pusakapusaq.	with me."
Chaytaq waqawaq	And then when you see
Dios kutimuqtin	the wrath of God
Phiñakuyninta	when He returns
Rikuykuspayki.	You will cry.

Dios kutimuspan	When God returns
Waqyarimunqa	He will call to himself
Llapan qespisqa	all the saved
Wicharipusun.	so we will go up with Him.
Mana qespisqa	And the unsaved
Runakunataq	people
Ñak'ariyllapaq	will be left behind
Qhepakapunqa.	to suffer.

8) Hymn #53

Jesusmi harmurqan
Llapan huchayoqman.
Yuyayman kutirispa
Qespikunanchispaq.
Usqhayta chinpaykuy
Qespichiqninchisman.
Manaraq llakikuy
Chaymushaqtin.
Cristopi iñispan
Qespikullansunchis.
Wiñaypaq Jesuswan
Kawsakunanchispaq.

9) Hymn #60

Asuykamuy rumi sonqo	Come near, oh hard hearted one,
Munakuq Diosman	to the loving God.
Asuykamuy rumi sonqo	Come hear, oh hard hearted one,
Khuyakuq Diosman	to the compassionate God.
Payqa qespichisunki	He will save you
Millay huchaykimanta	from your filthy sin.
Huchaykitapas willakuy	The living God calls you to himself
Kawsaq Diosllaman	so that he may forgive your sin.
Diosmi pampachasunki	God will forgive
Tukuy huchata.	all your sin.
Diosqa waqyashasunki	God is calling you
Runamasillay	my fellow man
Sonqoykipi chaskiykukuy	Receive my God as yours
Diosnillaykita	in your heart.
Iñiyninchipi saysun	In His faith we will stand,
Wawqe panallay	brothers and sisters,
Mana kay pachaq kaqninpi	and we will not be left behind
Qhepakunapaq	with those who stay behind.

10) Ruwaykuna 2:1-12 (from Quechua Bible)

Pentekostes p'unchay chayamuqtintaq, huq cheqaspi llapallanku huq nisqalla huñukurqanku. Hinan qonqayllanmanta huq kunununuy tutuka wayraq phukusqan hina hanaq pachamanta hamurqan. Hinaqtinmi tiyashasqanku chay wasita hunt'aykurqan. Hina kaqtinmi paykunapurapi rakisqa nina hina rimaykuna rikhuriqan. Hinan sapankaq patanpi tiyayurqan. Diosmi llapankuta Santo Espirituwan hunt'aykurqan. Hinan rimanankupaq Espirituq qosqanman hina, huq niray rimaykunapi rimayta qallariqanku.

Hinan hanaq pachaq pachanpi tukuy suyukunamanta Jerusalenpi tiyaq Dios manchakuq judio qharikuna kasharqanku. Chay kunununqtintaq askha runakuna huñukurqanku. Sapankan rimasqanku rimaypi rimaqta uyrirqanku, chayraykun yuyayninkupi pantachisqa kasharqanku. Hinan utirayaspa hinallataq yuyayninku mana kabesqa kasharqanku. Huqkuna huqkunawantaq ninakurqanku:

Qhawariychis. Manachu kay rimaqkunaqa Galileamanta runakuna kanku. Imaynataq ñoqanchisri nansesqanchis rimayninchispi sapanka uyarinchis. Noqanchisqa Partiamanta, Mediamanta hinallataq Elammantan kanchis.

Hinallataq. Mesopotamiapi, Judapi, Kapadosiapi, Pontopi hinallataq Asiapi Tiyaqkunan kanchis. Hinallataqmi Frigiamanta, Pamphiliamanta, Eqiptomanta hinallataq Libiaq suyunkuna Sireneq wakladonkunamanata kanchis. Romamanta Judiokuna hinallataq judiokunaman t'krakuqkuna kaypi tiyaqkunan kanchis. Kretamanta hinallataq Arabiamanta iman kanchis. Diospa imaymana hatun ruwasqankunatan rimasqanchis rimaykunapi rimasqankuta uyarinchis, nispanku. Llapankun utirayasqa hinallataq ancha iskayrayasqa kasharqanku. Hinaqtinmi huqkuna huqkunawan ninakurqanku: -Imaninantataq kayri nin, nispanku. Wakintaq ichaqa asipayaspa nirqwanku: -Mosoq binowan machasqan kashanku, nispanku.

English translation: Acts 2:1-12 (New International Version)

When the day of Pentecost came, they were all together in one place. Suddenly a sound like the blowing of a violent wind cane from heaven and filled the whole house where they were sitting. They saw what seemed to be tongues of fire that separated and came to rest on each of them. All of them were filled with the Holy Spirit and began to speak in other tongues as the Spirit enabled them.

Now there were staying in Jerusalem God-fearing Jews from every nation under heaven. When they heard this sound, a crowd came together in bewilderment, because each one heard them speaking in his own language. Utterly amazed, they

asked: "Are not all these men who are speaking Galileans? Then how is it that each of us hears them in his own native language? Parthians, Medes, and Elamites; residents of Mesopotamia, Judia, and Capedocia, Pontus and Asia, Phrygia and Pamphylia, Egypt and parts of Libya near Cyrene; visitors from Rome (both Jews and converts to Judaism); Cretens and Arabs – we hear them declaring the wonders of God in our own tongues! Amazed and perplexed, they asked one another, "What does this mean?"

APPENDIX D
Data Files

Damaris	Quechua-Dominant		
Vowel	F1	F2	Gloss
[ɪ]	345	2622	chaymi
[ɪ]	406	2689	hamurkanki
[ɪ]	427	2710	yupaychakiku
[ɪ]	494	2391	qispichiqllay
[ɪ]	427	2737	qispichiqllay
[ɪ]	474	2622	qispichiqllay
[ɪ]	420	2662	qispikuymanta
[ɪ]	420	2785	qunaykipaq
[ɪ]	427	2615	willamuq
[ɪ]	426	2628	kanki
[ɪ]	426	2750	yupaykiku
[ɪ]	521	2425	qispichiqllay
[ɪ]	508	2466	qispikuymanta
[e]	575	2337	jesusllay
[e]	582	2225	señor
[e]	616	2350	señor
[a]	670	1660	taytallayku
[a]	644	1761	pachaman
[a]	650	1619	pachaman
[a]	684	1619	willamuq
[a]	725	1659	runa
[o]	589	1553	señor
[o]	579	1592	señor (2)
[ʊ]	447	1158	runaq
[ʊ]	569	1016	willamuq
[ʊ]	468	1227	yupaychamaykiku
[ʊ]	440	1178	tukuy
[ʊ]	487	1016	unanchaq
[ʊ]	447	1138	taytallayku
[ʊ]	406	1199	yupaychamaykiku
[ʊ]	521	1077	hamurqanki

Damaso	Spanish-Dominant		
Vowel	F1	F2	Gloss
[ɪ]	413	2310	hinan
[ɪ]	359	2459	niray
[ɪ]	399	2249	rimaykunapi
[ɪ]	413	2378	rimaykunapi (2)
[ɪ]	427	2425	rimayta
[ɪ]	313	2360	hina
[ɪ]	352	2452	hina (2)
[ɪ]	359	2330	espirituwan
[a]	596	1883	llapankuta
[a]	725	1510	qusqaman
[a]	630	1605	niray
[a]	630	1449	rimaykunapi
[a]	627	1747	hina
[ʊ]	359	1104	llapankuta
[ʊ]	359	1287	espirituwan
[ʊ]	399	1002	hunt'kayurkan
[ʊ]	495	1086	rimaykunapi
[ʊ]	413	1044	qusqaman
[ʊ]	399	1070	huq

Florenica	Monolingual Quechua		
Vowel	F1	F2	Gloss
[ɪ]	515	2785	hina
[ɪ]	514	2812	kutirimuy
[ɪ]	529	2839	kutirimuy
[ɪ]	508	2507	qispichiqta
[ɪ]	576	2425	qispichiqta
[ɪ]	522	2818	hina (2)
[ɪ]	529	2866	winay
[ɪ]	508	2811	runamasi
[ɪ]	514	2825	sunqullaypi
[ɪ]	501	2865	sunqullaypi (2)
[ɪ]	535	2879	winay (2)
[a]	718	1659	kasun
[a]	704	1931	hina
[a]	766	1725	sunquytapas
[a]	657	1673	kawsanpaq
[o]	542	1539	diosman
[o]	548	1585	cristowanna
[ʊ]	508	1253	kutrimuy
[ʊ]	528	1016	sunquytapas
[ʊ]	535	1213	kutrimuy
[ʊ]	542	1239	kasun
[ʊ]	522	1219	kasun (2)
[ʊ]	528	1118	runamasi
[ʊ]	535	962	qupushani
[ʊ]	576	1036	quni
[ʊ]	542	935	sunqullaypi
[ʊ]	521	968	sunqullaypi
[ʊ]	535	901	sunqullaypi (2)
[ʊ]	555	975	sunqullaypi (2)

Inmaculada	Quechua-Dominant		
Vowel	F1	F2	Gloss
[ɪ]	393	2622	munakuyninmanta
[ɪ]	399	2601	churin
[ɪ]	359	2744	wat'iqaypi
[ɪ]	372	2785	qispichisunki
[ɪ]	386	2771	qispichisunki (2)
[ɪ]	467	2418	qispichisunki
[ɪ]	501	2439	wat'iqaypi
[ɪ]	467	2398	qhipakunapaq
[ɪ]	514	2445	qispichikuymanta
[e]	521	2242	jesuscristomanta
[e]	528	2188	jesusllata
[a]	691	1782	manta
[a]	637	1836	yawarninwanmi
[a]	697	1707	yawarninwanmi
[a]	657	1802	wat'iqaypi
[o]	508	1612	jesuscristomanta
[ʊ]	576	962	sunqu
[ʊ]	596	995	sunqu (2)
[ʊ]	562	1023	khuyakuq
[ʊ]	508	1009	munakuyninmanta
[ʊ]	487	1104	churin
[ʊ]	582	996	sunqu
[ʊ]	603	962	sunquykipi
[ʊ]	487	1063	khuyakuq

Isabel	Spanish-Dominant		
Vowel	F1	F2	Gloss
[ɪ]	399	2635	si̲minqa
[ɪ]	413	2771	si̲nchi
[ɪ]	413	2791	ri̲maykuwanchis
[ɪ]	434	2628	purinanchi̲spaq
[ɪ]	390	2798	puri̲nanchispaq
[ɪ]	398	2601	kawsananchi̲spaq
[ɪ]	352	2839	siminqa (2)
[ɪ]	379	2655	kikiyki̲chista
[ɪ]	372	2737	ki̲kiykichista
[ɪ]	393	2723	qispichi̲qman
[ɪ]	393	2794	qispichi̲qpaq
[ɪ]	413	2804	qi̲spichiqpaq
[ɪ]	345	2298	simi̲nqa (2)
[ɪ]	386	2737	allinuywan
[ɪ]	359	2649	huchallanchista
[ɪ]	399	2750	kaychischu
[ɪ]	413	2649	uyariqa
[e]	487	2459	senoriypa
[e]	501	2310	espejo
[e]	508	2452	senormi
[a]	684	1233	llamp'in
[a]	691	1511	nuqa
[a]	691	1308	diospa
[a]	799	1328	q'utukuspaqa
[a]	806	1572	aswanpas
[a]	684	1639	ama̲
[a]	711	1781	huchallanchista̲
[o]	494	1009	espejo
[o]	521	1341	senor
[ʊ]	426	1178	kaychisu
[ʊ]	372	1266	mu̲nakusqakay
[ʊ]	399	1056	munaku̲y
[ʊ]	434	1037	q'utuku̲spaqa
[ʊ]	487	1151	mu̲suq

[ʊ]	372	1192	musu̲q
[ʊ]	393	1192	huchallanchista

Juana	Spanish-Dominant		
Vowel	**F1**	**F2**	**Gloss**
[ɪ]	413	2893	qanmi
[ɪ]	420	2832	kanki
[ɪ]	440	2873	chaymi
[ɪ]	420	2899	qi̲spichiqllay
[ɪ]	393	2852	qispi̲chiqllay
[ɪ]	420	2899	qispichi̲qllay
[ɪ]	386	2859	hamurkanki
[ɪ]	453	2859	qi̲spikuymanta
[ɪ]	413	2879	qispi̲kuymanta
[ɪ]	393	2913	willamuq
[ɪ]	399	2703	diosni̲llay
[ɪ]	379	2838	qunaykipaq
[e]	582	2012	espiritullay
[e]	447	2243	senor
[a]	670	1877	kamaqllay
[a]	664	1829	hallpa
[a]	684	1849	pacha̲man
[a]	643	1876	chanin
[a]	616	1720	chaymi
[a]	711	1883	unancha̲q
[ʊ]	440	1118	tu̲kuy
[ʊ]	406	1037	qunaykipaq
[ʊ]	413	907	qunaykipaq (2)
[ʊ]	413	1023	unanchaq
[ʊ]	426	989	runaq
[ʊ]	420	962	taytallayku
[ʊ]	440	914	hamurkanki
[ʊ]	413	1138	qispikuymanta
[ʊ]	413	1036	willamuq

Laura	Spanish-Dominant		
Vowel	F1	F2	Gloss
[ɪ]	393	2453	takisaq
[ɪ]	373	2547	munani
[ɪ]	406	2629	llank'ananpi
[ɪ]	363	2567	llank'ananpi (2)
[ɪ]	399	2622	kawsayninta
[ɪ]	397	2561	llank'ananpi (3)
[ɪ]	407	2683	qispichiqman
[ɪ]	372	2642	qispichiqpaq
[ɪ]	386	2554	llank'ananpi (4)
[ɪ]	413	2473	lliwatiyninpi
[ɪ]	420	2472	lliwatiyninpi
[ɪ]	406	2472	simillanmanta
[e]	481	2256	jesusmanta
[e]	528	2262	senorniypa
[e]	467	2310	senorpaq
[a]	874	1613	willasaq
[a]	772	1721	llank'asaq
[a]	846	1897	simillan
[a]	745	1822	takisaq
[a]	765	1870	llank'ananpi
[o]	508	1226	senorniypa
[o]	467	1043	senorpaq
[o]	528	1308	senormi
[ʊ]	481	1070	sumaq
[ʊ]	393	995	munani
[ʊ]	481	1050	p'unchay
[ʊ]	481	942	munakuq
[ʊ]	434	1138	nuqa
[ʊ]	440	996	munakuq (2)
[ʊ]	488	1077	pusaspa
[ʊ]	440	1043	nuqaq
[ʊ]	460	1057	churasqa
[ʊ]	454	1097	manakuytan

Lorena	Spanish-Dominant		
Vowel	F1	F2	Gloss
[ɪ]	386	2351	chaymi
[ɪ]	399	2445	qispi̲kuymanta
[ɪ]	407	2439	qi̲spichiqllay
[ɪ]	406	2344	willamuq
[ɪ]	379	2527	qunaykipaq
[ɪ]	426	2330	chanin
[ɪ]	386	2425	diosnillay
[ɪ]	406	2418	hamurkanki
[ɪ]	399	2506	qispi̲chiqllay
[ɪ]	406	2520	qispichi̲qllay
[ɪ]	406	2472	qi̲spichkuymanta
[e]	461	2480	senor
[e]	548	2276	jesusllay
[a]	827	1938	ka̲maqllay
[a]	888	1789	kama̲qllay
[a]	813	1931	runaq
[a]	867	1924	ha̲murkanki
[a]	874	1917	qispikuyma̲nta
[a]	833	1856	willamuq
[o]	562	1226	senor
[o]	542	1215	diosnillay
[ʊ]	433	1037	sumaq
[ʊ]	420	1064	qunaykipaq
[ʊ]	413	1016	willamuq
[ʊ]	447	1036	tuku̲y
[ʊ]	460	1097	runaq
[ʊ]	399	989	taytallayku
[ʊ]	487	942	hamurkanki
[ʊ]	399	1090	tu̲kuy

Mercedes	Monolingual Quechua		
Vowel	F1	F2	Gloss
[ɪ]	501	2452	uyarikuy
[ɪ]	474	2439	runamasi
[ɪ]	461	2323	diosnichispa
[ɪ]	522	2317	simillanta
[ɪ]	494	2398	simillanta
[ɪ]	501	2418	pachapi
[ɪ]	535	2317	atipasqan
[ɪ]	515	2349	diosninchispa
[ɪ]	495	2330	diosninchispa
[a]	684	1789	pacha
[a]	617	1613	llaqtamanta
[a]	657	1748	llaqtamanta
[a]	630	1720	huchallanpa
[a]	664	1734	atipasaqan
[ʊ]	494	1043	waqyakamun
[ʊ]	535	1057	runamasi
[ʊ]	514	1057	runa
[ʊ]	535	1029	tukuy
[ʊ]	528	1084	huchallanpa
[ʊ]	542	1213	uyarikuy

Pilar	Monolingual Quechua		
Vowel	F1	F2	Gloss
[ɪ]	522	2473	chayamushaqtin
[ɪ]	508	2520	inispan
[ɪ]	556	2493	chinpaykuy
[ɪ]	556	2025	qispichiqnin
[ɪ]	487	2472	winaypaq
[ɪ]	501	2066	qispikunanchis
[ɪ]	556	2446	jesusmi
[ɪ]	528	2066	qispikunanchispaq
[ɪ]	528	2540	llakikuy
[ɪ]	528	2432	kutirispa
[ɪ]	501	2445	qispikullansunchis
[e]	521	2121	jesuswan
[e]	535	2174	jesusmi
[a]	697	1626	llapan
[a]	664	1863	llapan
[a]	671	1768	chinpaykuy
[a]	637	1579	kutirispa
[a]	637	1748	winaypaq
[o]	528	935	cristopi
[ʊ]	596	1128	kawsakunanchis
[ʊ]	569	914	hamurqan
[ʊ]	535	1050	huchayuqman
[ʊ]	555	1300	kutirispa
[ʊ]	495	1375	qispikunanchispaq
[ʊ]	481	1338	qispikullasunchia
[ʊ]	556	1341	qispikullasunchis
[ʊ]	481	1321	chayamushaqtin
[ʊ]	508	1361	chinpaykuy

Roberto	Quechua-Dominant		
Vowel	F1	F2	Gloss
[ɪ]	393	2486	wasita
[ɪ]	345	2588	nuqanchi̲sri
[ɪ]	346	2579	nuqanchisri̲
[ɪ]	373	2113	nansi̲sqanchis
[ɪ]	366	2676	nansischanchi̲s
[ɪ]	339	2554	rimayninchi̲spi
[ɪ]	393	2506	rimayninchispi̲
[ɪ]	319	2676	imaynataq
[ɪ]	332	2472	uyri̲nchis
[ɪ]	386	2588	uyrinchi̲s
[ɪ]	386	2547	hina
[ɪ]	393	2622	hi̲naqtinmi
[ɪ]	399	2588	hinaqti̲nmi
[ɪ]	386	2493	hinaqtinmi̲
[a]	677	1837	qunqallamanta̲
[a]	569	1890	wasita̲
[a]	603	1700	imaynataq
[a]	562	1788	sapanka
[ʊ]	420	1064	ku̲nununuy
[ʊ]	407	1098	kununu̲nuy
[ʊ]	434	1187	tu̲tuka
[ʊ]	454	1131	tutu̲ka
[ʊ]	427	1097	phuku̲sqan
[ʊ]	447	836	qunqallamanta
[ʊ]	474	914	nuqanchisri
[ʊ]	339	1287	kunununu̲y
[ʊ]	372	1131	tiyashasqanku
[ʊ]	447	1050	uyrinchis

Segundina	Quechua-Dominant		
Vowel	F1	F2	Gloss
[ɪ]	576	1999	purinanchispaq
[ɪ]	549	2079	purinanchispaq
[ɪ]	589	2329	rimawanchismi
[ɪ]	556	2208	kutimuqtin
[ɪ]	508	2256	kutimuqtin
[ɪ]	535	2188	qispisqa
[ɪ]	562	2107	qispisqa (2)
[ɪ]	549	2109	qhipakapunga
[a]	813	1673	ama
[a]	806	1707	ama
[a]	827	1741	uyariqllaqa
[a]	847	1707	sumaqmi
[a]	819	1680	qhipakapunga
[a]	860	1687	q'utukuspaqa
[ʊ]	637	948	musuq
[ʊ]	623	1003	llamp'u
[ʊ]	637	1646	kaychischu
[ʊ]	617	1009	q'utukuspaqa
[ʊ]	603	1510	q'utukuspaqa
[ʊ]	583	1036	q'utukuspaqa
[ʊ]	609	1023	kunan
[ʊ]	528	1063	pusakapusa
[ʊ]	549	1131	pusakapusa
[ʊ]	623	1097	qhipakapunga

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