Doctoral Thesis

Phonetic and Phonological Changes in Obsolescing Languages

A Case Study of the Khorasani Variety of Kurmanji Language

危機言語の音声・音韻変化ーホラーサーンのクルマンジー語の事例的研究–

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Abstract

Most studies on obsolescing language situations deal with gradual change, the loss of language in language-contact situations. Such situations have an intermediate stage of bilingualism in which the dominant language is employed by an increasing number of individuals and characterized by the robust factor, age. As younger generations in a subordinate community shift to the dominant language, fewer children learn the minority language, and often those who do so learn it imperfectly, resulting in semi-speakers, people who have learned the language to some degree but are not fully fluent. This is the situation of the gradual shift of a minority language, with a greater frequency of variation, to a majority language. The literature on sound change in obsolescing languages has focused on whether the changes are internally or externally motivated which result in either convergence with or divergence from the dominant language. This distinction has left differences between the categorical phonological shift, which can eliminate phonological distinctions, and gradient phonetic effects, which may minimally impact on the native structure of the language. It is worth noting that these types of changes may coexist within the same community of minority languages in contact with the dominant language. The theoretical framework for this research is described in chapter 1. This research makes contributions to our understanding of phonetic and phonological change in endangered language contexts from phonetic and phonological as well as sociophonetic perspectives.

Large-scale investigations on sound change in obsolescing languages are notably lacking for some languages, in particular the Iranian group. This dissertation therefore targets one of the languages of the Iranian group, one of the geographically most isolated from its origin, namely the Khorasani variety of Kurmanji (Northern Kurdish) language in the northeast of Iran which is introduced in chapter 2. Following recent investigations of obsolescing languages, I present a study of phonetic and phonological changes in the Khorasani Variety of Kurmanji based upon recordings of two generations of speakers. This dissertation focuses on the realization of two different sound changes to investigate

whether these changes are gradual shifts or categorical changes. Firstly, I analyze the phonological contrasts of initial voiceless consonants in chapter 3 in order to find the differences of voice onset time as a phonetic correlate of a voicing distinction to investigate the process of language change regarding interference from the strong dominant language, Persian. VOT has been defined as the time interval between the onset of release burst and the onset of periodicity that reflects laryngeal vibration. Three contrastive categories were defined regarding VOT values: Fully voiced stops (Voicing Lead); voiceless unaspirated stops (Short Lag) and voiceless aspirated stops (Long Lag). Kurmanji has contrastive aspirated/unaspirated stops and affricate consonants, rarely found in other Iranian Languages, especially Persian. Acoustic analysis of the VOT value of Kurmanji initial stops show that VOT values in Kurmanji exhibited the expected pattern of drift from short lag to long lag VOT with a significant increase occurring between Generation1 (55 - 65 years old) and Geneartion2 (30 – 35 years old). Later generations appear to have returned to patterns found in the speech of earlier members of the community and long lag VOT has clearly established itself a salient social and regional marker today. This is likely because Generation2 Kurmanji speakers do not form a cohesive Kurmanji community compared to Generation1 and therefore have no opportunity to talk casually outside the home, thus, they merge into the dominant Persian and the VOT value of Generation2 speakers is rapidly pulled through the VOT value of the dominant Persian.

The second investigation of sound change in Kurmanji which is described in chapter 4 is consonant cluster reduction, namely the deletion of /w/ in the cluster /xw-/, which the younger generations tend to simplify. An example representing the cluster onsets is the reflexive pronoun “xwe”. This case study evaluates the effects of a dominant Persian on the complex onset in the phonological system of bilingual Kurmanji-Persian speakers. Fricative + glide sequences whose structural status as a complex onset is debated in the Kurmanji phonology literature, patterned differently from Persian phonology in which the consonant cluster cannot occur in the onset. The syllable structure of Persian is CV(C)(C), while the syllable structure in Kurmanji is (C)CV(C)(C). Specific findings are viewed in light of relative markedness of consonant

clusters in syllable-initial position in terms of their relationship to singletons which comprise a simple onset, meaning that only a single segment occupies the prevocalic position and is considered unmarked as compared to those more complex consonant clusters. Formant transitions proved useful in discriminating between the fricative+glide clusters (xw-) and the fricative (x-) alone, and in distinguishing degrees of rounding after the consonant clusters in Generation1 and Generation2. Formant transitions in Generation2 do not associate with lowering the F2 values of the adjacent vowel. Thus the consonant cluster /xw-/ substituted with the singleton /x-/, a more likely path to the change, involves transfer where /x-/ was incorporated into speakers' Kurmanji system during a period of heavy Persian use or during their concurrent acquisition of the two languages as a child.

It is clear that categorical changes, loss of allophones, and sub-phonemic variation are all characteristics of sound change in obsolescing languages. The extent to which sound changes have occurred in the Kurmanji language of Khorasan is considered through instrumental phonetic investigation in this dissertation. Acoustic correlates of the voicing distinction show that the younger generation maintains the phonological patterns of the older generation, but the categories are less distinct. The narrowing of the aspirated/unaspirated contrast in younger generations of Kurmanji speakers suggest that later generations of speakers of Kurmanji language may not necessarily lose contrasts, but may exhibit increased subphonemic variation, causing the category boundaries to become less discrete. Unlike the findings from voicing distinctions which suggest the approximation of the gestures for the long lag VOTs, the formant analysis of the vowel following the consonant cluster displayed no trace of /w/ in the younger generation of Kurmanji speakers. This result shows the reduction of /xw-/ to /x-/ in the onset of Kurmanji syllables and indicates the categorical shift to the Persian category in which consonant clusters in the onset are not employed.

Considering the fact that speakers of an obsolescing language are expected to make fewer phonological distinctions, yet maintain distinctions in the endangered language that also exist in the dominant language, and phonological distinctions with a low functional load are to be lost prior to those with a high functional load offers two

feasible approaches to the investigation of sound change in the present study. This point of view emphasizes the effect of the phonological structure of the Persian dominant as the causal factor in the loss of oppositions in Kurmanji (external motivation); the markedness view, on the other hand, suggest that the marked nature (unnaturalness due to the difficulty of pronunciation) may contribute to its merger with the unmarked feature. Thus the lack of aspirated/unaspirated distinctions and the phonotactic constraints of the consonant clusters in the onset of syllable structure in dominant Persian and the tendency to reduce markedness conceivably could have worked in concert, jointly leading to the loss in Kurmanji and the convergence with Persian. These findings support the assertion made in Campbell and Muntzel (1989) in which the authors predict that the variability in production increases as a function of the level of language obsolescence.

After investigating the two experiments of sound change in Khorasani variety of Kurmanji, I suggest a new perspective in chapter 5, which investigates the relationship between social factors and phonetic variation, i.e. Sociophonetics, in examining variation in sound change. A key element in accounting for the sociophonetic properties of speech is to factor in an understanding of how individuals construct their social world and how they use language (phonological patterning in particular) to position themselves within it.

Assuming that children learn language via input from more than one individual, it follows that all tokens of all words will inherently contain reference to individual speakers. They thus form a foundation for learning more arbitrary relationships between linguistic forms and social factors. These will include variable forms particular to a given dialect or community. A child growing up in a Kurmanji community in Khorasan, for example, needs to learn the various forms of voicing distinctions in initial stops i.e. [D:T:T^h] (See Chapter 3) or initial consonant cluster variation /xwa/*vs.*/xa/*vs.*/xo/ (See Chapter 4), all of which are social differentiated but which have no transparent grounding in biological differences, are not used by all individuals in these groups, and are more restricted in their frequency of occurrence.

Reviewing evidence from studies of contact-induced language change from the sociophonetic perspective and unlike the anthropologists' viewpoint claiming that individuals' behavior in the lab need not reflect their behavior in day-to-day life, in

chapter 6 after concluding the dissertation I suggest that it is the combination of detailed phonetic analysis and ethnographic and social approaches which holds the key to an integrated understanding of how social factors such as intergenerational differences and the dominant language can have an effect on phonetic variations in an obsolescing language. I suggest that researchers can take steps to ensure that the experimental context resembles to some degree the tasks that individuals might reasonably conduct in a daily basis. In this respect, if participants in the experiments are also participants in the field ethnographies, we will be able to conduct experiments that specifically probe individuals' encoding of particular linguistic and social universes in which they participate on a daily basis.

Chapter One

Introduction

Chapter 1: Introduction

1. Introduction

Language and language varieties usually become endangered because their speakers are in contact with a group whose language or variety has, or is gaining social, political and economic prestige in the local or wider arena. When speakers of a language begin to interact with speakers of one or more other languages, changes in the language ecology of the speech community can take place. Social functions that were previously conducted in one language may now be conducted, at least partially, in another. Consequently, some degree of change in how one or more of the language is spoken is a likely outcome. Changes may be observable in speakers' lexical choices, use of structure (phonology, phonotactics, morphology, syntax, semantics, discourse), or pragmatic conventions (the conventional ways that linguistic acts are performed). Some changes might not be observable in the speech of the first generation of speakers in contact, but may be seen in that of subsequent generations.

When we consider language contact phenomena, both social and structural factors must always be taken into account (Weinreich 1953). The underlying cause of language contact is social, in that speakers of different languages come into contact with each other, for a variety of reasons including migration (which occurs for many reasons), trade, colonization or military occupation, and increased mobility of speakers. Different social settings and attitudes lead to different outcomes. Some linguistic behaviors are both an outcome and a mechanism of change, depending on the social dynamics of the situation. For instance, code-switching, the use of two or more languages in one conversation, may be an outcome when it occurs often in a situation of stable bilingualism, and is a

mechanism when it is the means through which elements of one language come to be incorporated into another. Social factors influencing mechanisms and outcomes include the reasons for the contact, the differences in size and social prestige or dominance of the group of speakers, the amount of social and cultural pressure groups exert on each other, and the relative instrumental value of the languages. Instrumental value is a measure of how useful the language is for the economic and social advancement of the speaker. Each group's willingness to learn another language and the level of proficiency to which they want to learn it, are important, which in turn depends at least partly on the afore-mentioned factors. Social-psychological factors include strategies of second and subsequent language learning, individual language dominance, attitudes to each language, linguistic ideology, and the extent to which speakers alter their own speech styles to align more or less with those of their interlocutors (a process called ACCOMMODATION). The notion of language dominance refers to two kinds of phenomena. One is the sociolinguistic situation in which a language is socially and politically dominant, and the other pertains to an individual's differential use of two or more languages. A bilingual or multilingual speaker will often use one language more frequently than another, so that language can be said to be dominant (Grosjean 2008). Though there are various ways in which languages can become extinct, the most typical is through **language shift** when a language gradually comes to have fewer and fewer speakers who use it in ever fewer domains until finally no one is able to speak it in any context (Grenoble 2000). This process is sometimes called **Language Obsolescence**, and a language which undergoes it is referred to as an **Obsolescing Language**. There can be considerable impact on the structure of the endangered language in these situations (Campbell and Muntzel 1989). This can have important implications for typological claims and for the study of language change in endangered languages.

I first present some outcomes of language contact, then linguistic and social mechanisms operating in contact situations. Following these, I discuss notions of how contact-induced change is perceived by speaker communities and others, and the question of whether contact-induced change is inevitable. Then I address the kinds of variation and

change found in endangered languages. Specifically, I consider the impact that language endangerment can have on the structure of languages and the kinds of changes and structural differences they can exhibit in contrast to fully viable, non-endangered languages.

2. Overview of language contact and change

2.1. Language maintenance.

At a very broad level of categorization, the outcomes of language contact can be language maintenance, language shift or language creation. The outcomes are all results of mechanisms commonly found in situations of language contact, but do not always lead to the extreme results of language shift or creation. Each language can potentially exert an effect on the other in patterns of structure and use. In language maintenance situations the language continues to be spoken, but there is often some influence of one language on the other, in both structures and words. This does not necessary lead to the loss of a language; it can still be maintained, but with some changes. Speakers of a maintained language typically borrow features from another language, and many languages contain some material which is originally from others. Borrowing is the incorporation of lexical or structural features of another language into the speaker's first language (Thomason and Kaufman 1988: 37), known also as "recipient language agentivity" (Van Coetsem 2000). The agents of change through borrowing are either fluent bilinguals, or speakers with higher levels of proficiency in the recipient (borrowing) language than in the source language. Usually, when contact is not intense, lexical items are borrowed first and most often, and through them structural features can be borrowed, although this happens much less frequently. For example, a suffix can be borrowed along with a word on which it occurs and then be extended as a suffix on other words. When contact is more intense, typically the case in the contexts of language endangerment, structural features can spread from one language to another, so that the languages involved become more structurally similar, known as structural convergence. The agents of the change are most likely bilingual or multilingual speakers dominant in the source language (Van Coetsem's

(2000) "source language agentivity"). They bring phonological and morphosyntactic features of their dominant language to their weaker language and these are then incorporated by other speakers of the recipient language.

When several languages are in close contact, are in geographically neighboring areas and structural features are transferred between languages, the resulting zone of structural convergence is known as a SPRACHBUND (Trubetskoy 1928, cited in Thomason 2001) or linguistic area. The languages involved might or might not be endangered. In linguistic area, structural and lexical material can be transferred in both directions, by bilingual or multilingual speakers dominant in one language or the other, so that all languages involved are both recipient and source languages of different features (Gumperz and Wilson 1971), or material can be transferred from only some languages to the others. When words are borrowed, their phonology is often altered to fit that of the recipient language, but under intense contact the words may be borrowed with their original phonology, and new sounds may spread beyond the words in which they were originally borrowed (Heath 1978, Thomason and Kaufman 1988: 84). Elements or patterns in the receding language that do not also occur in the dominant language may be lost, for instance phonological contrasts (Bullock and Gerfen 2004), or marked elements (Andersen 1982, Palosaari and Campbell 2011).

Stable bilingualism or multilingualism occurs most often when all of the languages involved have relatively large numbers of speakers and high social status in their local and wider communities. Sometimes two languages coexist in a Diglossic relationship in which the social functions of each are complementary (Blom and Gumperz 1972, Ferguson 1959). One language is used for official, governmental and church functions (so called high prestige functions, labeled H) and the other is used for personal, intimate functions (so-called low prestige functions, labeled L). The low functions may include public but unofficial uses, such as in public meetings (Blom and Gumperz 1972). If there was previously only one language used for all functions, and then another came to be used in some of them, this situation can also be viewed as a case of partial language shift (Dimmendaal 1989, Weinreich 1953). There is an analogue for

domains within a language; the incoming language might be used in some registers or genres before others, e.g. numerals are often replaced early by those of the dominant language. Documentation efforts could focus on vulnerable areas first. The functional separation of languages in a diglossic situation is an advantage for an endangered language because there will be specific functions for each of the languages in contact (Fishman 1967, 2001, 2002). When two or more languages can be used interchangeably for some purpose, only one of them is needed. Provided that each language is used for a different set of functions, a minority language can be maintained within particular domains of use. It is common for an endangered language to be used for familial and home interactions, and a dominant language to be used for education, government, economic exchanges and administration. In many situations, the home domain is the last in which an endangered language is maintained, but in some situations of language shift traditional ceremonial purposes are the last domain in which a language is used (e.g. Mithun 1989: 244).

Bilinguals and multilingual speakers often use two or more languages in one conversation, a practice called code-switching. A great deal of research has shown that bilinguals competent in both languages may frequently code-switch, and the code-switching is rule-governed, and is socially meaningful (e.g. Auer 1998, 2000, Bentahila and Davies 1995, Clyne 1980, 2003, Grosjean 2008). Several hypotheses have been forward as to what triggers or facilitates a switch, and the ways in which the use of the two or more languages is grammatically constrained. Code-switching between languages can occur between sentences or clauses, called Inter-sentential code-switching, or within a sentence or clause, called Intra-sentential code-switching (or code-mixing by Muysken 2000). When the switching is intra-sentential it can be difficult to distinguish from borrowing, because both involve material from two or more languages in the same sentence. When individual words or morphemes from one language appear in a sentence which is otherwise in the other language, is the process borrowing or code-switching? Some researchers consider the distinction between the borrowing and code-switching essential to theories of language contact (e.g. Poplack and Meechan 1995), others see the

types of combination of material from each language as very closely related (e.g. Bakus 2005, Myers-Scotton 1993). Single lexical items which are transferred by recipient language speakers become phonologically integrated into the recipient language and after some time are accepted by all speakers as part of that language, and hence are generally accepted as borrowings. In contrast, a switch from lexicon and grammar of one language to that of another is widely accepted as code-switching.

Code-switching can be the mechanism for material from one language to be transferred to another (e.g. Backus 2004, 2005). Code-switching can also be a mechanism for speakers to gradually use one language more often than the other, altering the previous balance of language complementarity, which could be a threat to the domains of use of a minority language. For this reason, sometimes speakers of an endangered language establish domains in which code-switching is discouraged, Code-switching can lead to the formation of a new language, but in situations of stable bilingualism or multilingualism usually does not.

2.2. Language shift.

Clearly the most detrimental outcome for an endangered language is when a whole community shifts to another language; that is, members of the community stop speaking the precontact language habitually and mostly speak the post-contact language which comes to be the language of the next generation. The shift may take place in only one or two generations. Thus, it is estimated that the number of people speaking Breton in France reduced by 80 percent between 1950 and 1990, as it was no longer transmitted to children as their first language (Hornsby 2008: 129-130). But a shift may also take place over several generations. When a group is shifting to another language, its members might not become first-language-like speakers of the language they are learning, but transfer features of their own first language to it. This situation is called **shift-induced interference** or **substratum influence** (Thomason 2001, Thomason and Kaufman 1988), and differs from borrowing because the speakers performing the transfer are dominant in the source language which contains the features being transferred.

This is another instance of source language agentivity (Van Coestem 2000). If the two groups integrate socially, both groups can eventually come to speak a version of the incoming language that includes the differences brought about by the shifting group, as happened in the formation of Irish English (Odlin 1991, 1997). If the groups do not integrate socially, the shifting group may develop and additional varieties of the incoming language (Thomason 2001, Thomason and Kaufman 1988), which may be spoken alongside an endangered language, or may gradually replace it. Examples are some varieties of English and other wide-currency languages spoken around the world which developed through migration and colonization (e.g. Aboriginal English, Indian English). Each variety is differentiated by features of the speakers' pre-existing languages appearing in the language in which they have shifted to or which is now part of their linguistic repertoire.

When a group is shifting to another language, changes can take place in the pre-contact language through the process of **Language Attrition** (also called **Language Obsolescence**). Speakers may lose phonological distinctions in pre-contact language that are not present in the incoming language, phonological contrasts with a low functional load may be lost (Anderson 1982: 95, Campbell and Muntzel 1989: 186), marked features (those which are less common, and less regular) may be replaced with unmarked features or else used more often than they once were, once-obligatory rules may occur optionally, or morphological and syntactic patterns may be reduced (Campbell and Muntzel 1989). Some kinds of changes take place in other language-contact situations, and also in language internal change in other contexts, but in the context of language attrition they often take place very rapidly. Not all of the changes reflect patterns in the incoming language (Campbell and Muntzel 1989, Palosaari and Campbell 2011, O'Shannessy 2011).

3. Mechanisms of contact induced change

When we examine how and why contact-induced changes take place, we must always consider psychological, social and linguistic factors in interaction (Weinreich 1953: 3). Nevertheless, some kinds of linguistic transference are more common than others.

3.1. Linguistic factors in contact-induced change

What kinds of linguistic processes and results occur, and to what extent are they constrained by other linguistic factors? For some researchers one counterexample to a so-called rule means the rule does not hold; others interpret patterns and tendencies as constraints, acknowledging that they are influenced by social and psychological factors. The linguistic processes outlined in this section can occur in situations of language maintenance, shift or creation. The weighting given to each type of factor varies with each situation; many researchers agree that social-psychological factors can override linguistic tendencies or constraints (Johanson 2002; 5, Thomason 2001: 11, Winford 2003: 53), yet strong linguistic tendencies are seen to operate in particular sociolinguistic situations (Silva-Corvalan 2008: 221). In some situations it is difficult to disengage three possible paths of change: **transference** of abstract or overt elements of one language's grammar to the other; **internal change** within a language due to processes of attrition, which in turn were caused by contact (e.g. Grenoble 2000: 119), or; **internal processes** of change independent of contact. In the first two cases the change is contact-induced, but the extent to which contact between grammars is directly responsible in the second case is not clear. There are some typological factors which perform a constraining role over many phenomena of change: **Typological similarity, transparency and markedness** (Heath 1984, Thomason 2001, Thomason and Kaufman 1988, Weinreich 1953, Winford 2003). When languages have similar typological patterns, grammatical elements are more likely to be transferred from one to another. In Eastern Anatolia, Turkish has influenced the structure of clause subordination in structurally similar Laz, but not in structurally

dissimilar Iranian languages, even though all are spoken in the same area (Haig 2001: 212). Markedness concerns how frequently elements occur across languages and whether they are part of a regular paradigm. Marked features occur less often, and make a paradigm less regular, and are therefore less easily learned when acquiring a second language. Evaluations of markedness should be relative to the language pairs under study, as well as to other languages. Markedness is most important in shift-induced interferences, when a group is learning another language, as marked features might not be learned well, and might not be part of the shifting group's production of the dominant language. But marked features in an endangered language might be lost in favor of less-marked ones from the dominant language (Anderson 1982); examples from Pipil are given by Palosaari and Campbell (2011). Transparency, or the degree of integration of features, concerns how structurally integrated a morpheme is into its environment. A highly complex, bound multifunctional, phonologically reduced morpheme is less likely to be transferred than a simple, unbound, syllabic, unifunctional morpheme (Heath 1984, Thomason 2001: 77, Weinreich 1953, Winford 2003). Recall, for example, that whole words transfer easily by borrowing with minimally intense contact.

One language may have a functional category that is not present in another. If the less dominant language lacks the category it might gain it from the other language, or if the less dominant language has the category, it might lose it (Winford 2003: 96). For instance, young speakers of Warlpiri use dual person forms less often than older speakers do, probably because of contact with English (Bavin 1989: 285). But it is not always clear that contact is the trigger: A category might have been lost through **internal process of change.**

3.2. Social and psychological mechanisms in contact-induced change

Major social influences on the type of contact-induced changes that will occur include the relative size and sociopolitical status of the groups involved, the history and length of the contact, the types of social interactions in which speakers engage, their level of proficiency in each language, and the speaker's attitudes and ideologies (Thomason

and Kaufman 1988; Winford 2003). Although languages come into contact with each other for many reasons (Grenoble 2011), languages become endangered when there is a pressure on speakers of a language to speak a more dominant language or a lingua franca of the area. A lingua franca may itself be a contact language, and may in turn exert pressure on (other) minority languages. A language can become dominant because it is seen to bring a reward to its speakers, and/or it fulfills a specific communicative function, as outlined by Fishman (2001c). Rewards that come from speaking a particular language are interrelated and include instrumental rewards, through needing to use the language for trade, education or to gain employment, and increased status, when the language is seen to be prestigious in increasing numbers of domains. Increased status may include young people seeing the language as a symbol of youth and modernity. When the speakers of a language become the dominant social, political and economic group, their language is often expected to be used in public functions, further increasing its prestige and expanding its role.

Layers of dominance may be observed in a geographical area, interacting with other social forces, so that layers of pressure are exerted on one or more minority languages from one or more others. For example, in northeast of Iran, the dominant language in terms of government administration and education is Modern Persian, which is taught in schools and used in the majority of broadcast media. But for many Aboriginal people the usefulness of Persian beyond those domains is limited. Rather, Azeri/Turkish is also dominant as a common language among indigenous people, and the social pressure and need to use them when speaking to other indigenous people is high. Azeri is sometimes used in broadcast media but never in written media. The two languages, Modern Persian and Azeri in this region, exert pressure on the local languages, by narrowing or removing the communicative space in which the local languages have prestige. Use of the more dominant language in private and public functions increases and the reward for using them is participation in a larger social group. In small remote indigenous communities, there may be more pressure in the local traditional languages from Azeri than from Persian, because the speakers interact more with speakers of these

and of other traditional languages, using the common language, than with speakers of Persian. Part of the appeal of Azeri may be that it is not the colonial language, and is a clear marker of indigeneity since very few non-indigenous people use the language. These factors, and the relatively large number of speakers, make Azeri a threat to the minority indigenous languages. Also by speaking Azeri, individuals can maintain linguistic and cultural distinctiveness from the majority Persian community. Additionally, Azeri shows variation along geographical lines, and elements of traditional languages are typically brought into it. So speakers have access to a pan-indigenous language which shows local variation and distinction.

A psycholinguistic motivation for changes in one or both of a speaker's languages is that bilinguals need to respond rapidly to many different situations and interlocutors in different languages, a complex cognitive task. To reduce the cognitive load, they may regularize patterns, use infrequent constructions even less often, resulting in convergence of the two languages (Silva-Corvalan 2008: 215). Reducing cognitive load may be the motivation for bringing some elements, for instance, discourse markers, from the dominant language into utterances in the other language(s), reducing the number of competing options from which the bilingual speaker has to choose by using the discourse system of one language, rather than two or more (Matras 2000a, Sakel 2007). The patterns of borrowing or switching may then become entrenched in the minority language.

3.3. Convergence vs. Divergence change

In any verbal interaction speakers may highlight similarities to, or differences from, their partner's speech. **Convergence**, accentuating similarities with an interlocutor's speech style, and **Divergence**, emphasizing the differences, are concepts that have been developed in **Communication Accommodation Theory** (Giles and Coupland 1991; Giles et al. 1977, 1991). Convergence and divergence may be achieved through consciously or subconsciously manipulating a range of communication features, including language choice, accent, speech rate, vocal intensity, pause frequencies and gestures (Giles et al. 1991: 7). Convergence shows identification with an individual

interlocutor's speech, while divergence shows identification with the patterns of a group external to the immediate interaction, namely the speaker's social group, as opposed to the interlocutor's. A speaker might accentuate differences from an interlocutor's style to show membership of another group or to maintain an identity (Giles et al. 1991: 37).

Intergroup mechanisms of convergence and divergence may be part of long-term language and dialect shifts (Tradgill 1986) and language maintenance and survival (Giles et al. 1991). Introducing a new way of speaking requires an element of divergence. But once a change is underway, convergence might be a mechanism of continuing language shift. Converging with one's speech partner can lead to reinforcement of new, incoming ways of speaking, for example, code-switching. In unstable bilingual situations, where language shift is a strong possibility, speakers often say that they want to maintain the traditional language, yet their own interactions often use the incoming language. Accommodation theory helps to explain why this might occur, through the need to converge to one's interlocutor and conform to the conventions of one's speech community. Where an incoming language is used increasingly, convergence involves using it in a similar way. Divergence from the community interactional style by a speaker could be a mechanism for language shift reversal, through greater use of the endangered language, if that speaker's interlocutors in turn converged to his or her language choice. But the social cost and the effectiveness of diverging from the conventional style of the community in language endangerment situations have not been fully explored.

4. How is change evaluated?

Just as categorization of a way of speaking as "language X" or "a variety of language X" is very much influenced by social and political factors, judgments about when a language has changed "too much" to be considered the same language as before involve subjective social and political judgments. No linguistic community is homogeneous (Weinreich 1953), but if radical contact-induced changes take place, how are they viewed by speakers and others? Changes that occur over an extended time can result in great differences within a language, but it may still be perceived by speakers and

others as being "the same language". Changes due to contact often occur much more quickly than internally motivated changes and may be viewed more negatively by speakers and others, such that there is controversy over the identity of the new code: Is the emerging way of speaking still "language X"? A new way of speaking may be a threat to the traditional languages, but can also be seen as a form of language maintenance. For example, the new bilingual mixed languages in northern Australia are local, spoken only by members of the small communities in which they originated, and are considered by the speakers and others in the communities to be types of the traditional languages, yet they differ structurally and lexically from them. Community members accept the changes, perhaps because the new codes still remain distinct from varieties of English and Kriol, and contain many elements from the traditional languages. Speakers' view of a language that has undergone changes may take into account the source of receiving material from a fellow minority language, and prefer this to receiving material from a colonizing language. In linguistic areas speakers accept considerable structural material from other languages in the area, perhaps partly because they view those languages positively, in addition to the influence of the intense contact situation. Within a particular speech community there may be different degrees of tolerance of change: some people tolerate borrowing words and structures, others resist. Resistance often focuses on lexical elements because they are the most salient (Dorian 1994). While it seems intuitive that the less foreign material that is brought into a language the stronger it will be, this is not necessarily true (Dorian 1994: 479). Allowing lexical and structural material into a language has been shown to be successful for maintenance in some situations, since the new material fulfils a communicative need, such as for coining new terms. If younger speakers' incorporation of material from other languages is frowned upon, they may be deterred from using the minority language (e.g. Sallabank 2006: 46). Strict oversight of use of language structures can discourage speakers from using the language. If there is extensive change which is not approved by older speakers, opportunities to revitalize the language in its new form can be missed, so that the outlook for both the older and newer forms is less positive (Dorian 1994).

4.1. Is contact-induced change inevitable?

When languages come into contact and speakers of one language are learning another, a change in language use has already taken place. Some lexical or structural changes in one or both of the languages will often, but not always, occur. Yet these languages are severely endangered, so a change in language use has occurred, even if not in language structure or lexicon. How much and what type of change happens is a product of the interaction of socio-psychological and linguistic factors (Backus 2004, 2005, Johanson 2002, Thomason 2003. Thomason and Kaufman 1988, Weinreich 1953, Winford 2003). How difficult is it for a relatively under-resourced group to implement social change through resistance to change in progress? Can this be achieved so that the minority language also has a role and dispenses rewards to its speakers (Fishman 19991, 2001a, 2001c)? These questions are bound up in issues of access to resources, awareness of speech styles and choices, mechanisms of conventionalization of language use, and complex interactions of intergenerational socioeconomic and political factors (O'Shannessy 2011).

The prestige of language may be viewed differently by different groups within the community; for example, younger versus older speakers, so use of a language or linguistic form may be evaluated differently among within-community groups. Speakers may be aware that their language is endangered but not aware of or confident about their own role in its maintenance. Young people often see a traditional language as somehow old-fashioned, representing past traditions rather than contemporary concerns (Moriarty 2007). To them, use of a language associated with technology, global communication media and modern music, for example, is more appealing and reflects their identity as contemporary youth in the modern world. Young people are integral to the performance and as a result their interest in traditional cultural knowledge has been simulated (Pawu-Kurlpurlurnu et al. 2008: 36).

Speakers often see an economic and social advantage for their children speaking the dominant language of an area, in terms of access to higher education, advanced

technologies, and national and international information, and sometimes reluctantly choose the dominant language over their own minority language for some institutional functions, for example, education, or even for personal use in the home (Ladefoged 1992: 810). Another factor relates not to speaker attitudes but to speaker resources. Use of the dominant language(s) is often required for employment and administrative purposes. Governments are under pressure to show that they provide the resources for children to have the same educational participation and achievement levels in the national language(s) as children in other environments. This need not be at the expense of minority languages, because considerable research shows that participating in the early years of education in one's first language leads to greater achievement in education in the second language later (Baker 2006, Collier and Thomas 2004, Krashen and McField 2005). But sustaining formal education in minority languages takes considerable financial and human resources and commitment from both the local and wider communities (Coronel-Molina and McCarthy 2011). Although a community might prefer to promote several languages, speakers sometimes cannot see how that could be done with the limited resources they have. Where it can be done, the positive outcomes are many, although sometimes difficult to measure precisely. They include increased status of the language through its institutional role, and increased opportunities for exposure and use through school texts and in broadcast media.

5. Variation and variability

5.1. Variation in endangered languages

Variation in obsolescing languages need not exhibit the negative or positive sociolinguistic evaluations usually correlated with social variables such as socioeconomic class, sex, ethnicity, etc. so often found in viable languages. That is, variability often does not bear in the social meanings in speech communities undergoing severe language obsolescence that it may elsewhere. Some changes which take place in endangered language situations are "normal" or "natural" changes which can take place in non-endangerment situations as well (O'Shannessy 2011). An example is the merger of uvular

and velar consonants in endangered Mam of Tuxtla Chico (and indeed, also in several non-endangered branches of Mayan, as well). Although imperfect learning may be sufficient to explain many of these cases, the absence of the contrast from the dominant language (Spanish in this case) may also contribute to its loss in the endangered language. Some changes in obsolescing languages are natural, but the rate of change can be accelerated, with a change occurring much more rapidly than it might in a healthy language situation (Fox 2005: 57).

5.2. Individual Variability, the effect of semi-speakers

Most endangered language situations involve gradual decline in speaker numbers and speaker fluency. As more of the community shifts to the dominant language (cf. O'Shannessy 2011), fewer children learn the minority language, and often those who do so, learn it imperfectly, resulting in semi-speakers, people who have learned the language to some degree and are not fully fluent (Grenoble 2000). For example, Schmidt (1985a: 381) found that among Jambun Dyirbal (Australia) speakers, variability could be described on a continuum according to the degree of simplification of traditional Dyirbal, and this continuum correlated with the age of the speakers. This is typical of a gradual shift to a majority language: "Each individual had his own grammatical system for Dyirbal communication, involving simplification of the traditional grammatical norm to a greater or lesser degree." Languages can vary greatly in language endangerment situations, with potentially more kinds and greater frequency of variation than encountered in non-endangered languages. Things that are obligatory in a fully viable language may become optional or fail to apply and be lost in the language of semi-speakers. As Swadesh (1934, 1946) observed in his work with the last two speakers of Chitimacha (isolate, Louisiana), glottalized consonants could vary rather freely with their unglottalized counterparts (though original plain consonants do not vary with glottalized ones).

6. Types of change in endangered languages

Most cases in the literature on dying languages deal with gradual death, the loss of language due to gradual shift to the dominant language in language-contact situations. Such situations have an intermediate stage of bilingualism in which the dominant language comes to be employed by an ever increasing number of individuals in a growing number of contexts where the subordinate language was formerly used (Campbell and Muntzel 1989). This situation is characterized by a proficiency continuum determined principally by age (but also by attitudes and other factors). Younger generations have greater proficiency in the dominant language and learn the obsolescing language imperfectly, if at all. Some terms employed in discussions of such language death situations are: imperfect learning, partial learning, restricted code, semi-speaker, last speaker, healthy speaker/preterminal speaker/terminal speaker, better/worse terminal speakers, 'best' speakers/fluent speakers of single sentences/inserters of words/understanders, passive bilinguals, hybrid language, intermediate bilingualism, interlanguage, creolization in reverse, deacquisition, language decay, linguistic obsolescence, broken down or eroded language, linguistic atrophy, language attrition, etc. Not accidentally, these different terms suggest different beliefs about and theoretical orientations toward the process of language death (Campbell and Muntzel 1989).

The most obvious prediction one can make about dying languages is that their structure is very likely to undergo a certain amount of change, and in all component at that: phonological, morphological, syntactic, semantic and lexical. Nevertheless, it is much harder to predict the precise nature of the changes which may occur. In this thesis, I attempt to present examples of phonological changes, though syntactic and other phenomena also illustrate many of these kinds of change but fall outside of the scope of the present work.

6.1. Predictable or expected changes

For phonological change, Anderson (1982: 95) proposes three hypotheses which they represent generalizations with which few would quarrel, given what has long been reported for language contact situations: (1) the bilingual speaker of a threatened language will make fewer phonological distinctions in his or her use of the language than a fully competent (dominant or monolingual) speaker of the same language would; (2) he or she will preserve distinctions common to both his/her languages even while making fewer of the distinctions found only in the threatened language, and; (3) distinctions with a functional load which is high (in terms of phonology and/or morphology) will survive longer in the speaker's use of his/her weaker language than distinctions which have a low functional load (see also Dorain 1977b: 24). Many changes of this sort may be attributable, at least in part, to influence from the locally dominant language. For example, the changes of *ts* to *s* in Chiltiupan Pipil might also reflect influence from dominant Spanish, which has no segment *ts*. While influence from the dominant language (or languages) must always be taken seriously into consideration as possibly affecting the structure of endangered languages, concentrating rather on the kinds of structural changes languages can undergo regardless of whether these are abetted by influences from the dominant language.

6.2. Changes of uncertain predictability

Campbell and Muntzel (1989) have noted other kinds of structural changes which may or may not also be typical of dying languages; evidence from a much larger number of languages, distributed over more parts of the world, will probably be needed in order to determine how characteristic these may be of language death situations in general.

6.2.1. Overgeneralization of unmarked features

(loss of marked features through replacement with unmarked counterparts).

Marked features are traits of language which tend to be more unusual cross-linguistically, more difficult for children to learn, and more easily lost in language change.

They tend to be replaced by less marked ones (more common cross-linguistically, more easily learned) in language change. That is, difficult contrasts may not be learned or not learned well. (see Campbell 1976c; Dressler 1981a, Campbell and Muntzel 1989, Palosaari and Campbell 2011). This observation is naturally related to Anderson's hypothesis (1) considered above, that bilingual speakers of a threatened language will make fewer phonological distinctions than will fully competent speakers. Reference to markedness, however, suggests some refinement of this hypothesis, potentially predicting that when distinctions are lost, it is the marked member of opposition which is lost. Thus, in the case of the Tuxtla Chico Mam, (Campbell and Muntzel 1989) merger of *q* with *k*, lost *q* is the marked member of the opposition. Nevertheless, these two hypotheses are not necessarily completely compatible; the tendency to reduce markedness is not necessarily subsumed under Anderson's tendency to reduce oppositions not found in the dominant language.

Loss of markedness may include some things not covered by Anderson's generalization. Thus, marked phenomena which do not involve contrasts, but rather subphonemic, allophonic variants, may also be covered by the latter hypothesis. Moreover, the observation may also extend to nonphonological phenomena. The two hypotheses differ, however, not only in substance but in spirit. That is, Andersen's generalization seems to suggest that it is something to do with the structure of the dominant language which lies behind loss of oppositions in the threatened language (i.e. an 'external' motivation). The markedness proposal, while partially in sympathy with Andersen's view, suggests that it is another factor, namely the nature (marked or unmarked) of the linguistic phenomena in the structure of the dying language, which leads to loss (i.e. 'internal' factors). Thus, in the case of Tuxtula Chico Mam, Andersen's approach seems to emphasize the lack of *q* in dominant Spanish as the causal factor in its loss through merger with *k*; the markedness view, on the other hand suggests that the marked nature (unnaturalness, difficulty of pronunciation) of uvular *q* may contribute to its merger with unmarked *k*. Another way out of this seeming conflict is to appeal to "multiple causation", a notion becoming increasingly more standard in other areas of

historical linguistics. It can be presumed that any single factor may have been sufficient to cause the change, but that is also possible, even probable, that these factors combined, working in concert, contributing multiply to cause the linguistic change. Thus in Campbell and Muntzel's (1989) example, the lack of the *q* vs. *k* contrast in dominant Spanish and the tendency to reduce markedness (*q* being marked) conceivably could have worked in concert, jointly leading to the loss in Tuxtla Chico Mam.

6.2.2. Overgeneralization of marked features

While there may often be a tendency to reduce or eliminate marked forms, the reverse also appears to be common. That is, things that are marked or 'exotic' from the point of view of the dominant language may not be completely mastered by imperfect learners, and not knowing exactly where they belong, these speakers sometimes go hog-wild, as it were, employing the 'exotic' version with great frequency in ways inappropriate for the healthy version of the same language. These changes are internal to the structure of the obsolescence language in that they appear to have no direct analog in the dominant language. Hill (1983: 4), without calling upon markedness, refers to such cases as "acts of receptions". Thus, the overgeneralization of voiceless l in Teotepeque Pipil or the excessive glottalization in some Xinca speakers are "internal acts of creation" in that they appear to stem from imperfect learning of the moribund language and have nothing to do with Spanish.

6.2.3. Loss or reduction in phonological contrasts (mergers)

Language contraction, almost by definition, seems to involve reduction to fewer forms, fewer oppositions (Andersen 1989). Some scholars refer to such types of reduction as agreement markers (e.g. Campbell and Muntzel 1989, dual and plural in Ocuilteco). Such reduction is frequently attributed to some sort of process of "simplification" or the influence of another language (usually the language of the larger community or nation) or some combined influence of both. The two processes of simplification and transfer seem to account for a majority of the linguistic consequences of language contraction and death.

Some instances of phonological reduction and merger have already been seen (Campbell and Muntzel 1989, as for example, Pipil ts>s, V:>V, (that is, ts, s >s; V:, V>V), and Mam of Tuxtla Chico q>k; q'>k (q, k>k; q', k'>k').

6.2.4. Acts of reception

Some changes in moribund languages may be "externally" motivated; that is, some structural changes in dying languages may be the result of influence from linguistic aspects of the dominant language, i.e. "acts of reception" (Hill 1983: 4). Acts of reception in this context after two instances in which the minority language 'receives', or takes on, traits from the dominant language judged by speakers of the dominant language to be highly valued and also avoiding native traits of the minority language which might be associated with traits of the dominant language which are judged undesirable. Some structural changes can be due to influence from the dominant language where the minority language takes on highly valued structural traits of the dominant language which are otherwise quite foreign to the minority language (Campbell and Muntzel 1989, Palosaari and Campbell 2011). A probable example is the change in Teotepeque Pipil of š or ŕ under the external influence of sociolinguistic evaluation of these sounds in Spanish. The change is apparently motivated by the fact that in local Spanish, the dominant language, /ŕ/ has a strongly stigmatized variant [š̪] (Campbell 1976c). This change is due to an act of reception in which attitudes about pronunciation of a local Spanish dialect of the region are transferred to traits of the minority language, leading it to change. The negative sociolinguistic evaluation of this variant in Spanish has apparently caused the native Pipil sound to shift to the Spanish prestige variant, producing an unnatural sound change, externally induced due to Spanish norms.

7. Cultural consequences of language shift

The view that language loss has significant cultural consequences is a widely held one among both linguists (e.g. Dorian 1999: 31-33, Hale 1992: 6, Nettle and Romaine 2000) and speakers of endangered languages (e.g. Czaykowska-Higgins 2009: 32-33;

Hinton 2002: 152-154). The cultural consequences of language loss have been theorized in a number of ways, and the empirical focus of work in this area varies from concerns with lexically expressed cultural knowledge, to the dependence of communicative functions on linguistic form, to critically oriented engagement with language ideologies. Recent publications in language endangerment aimed at popular audiences implicate the shift from local languages to global ones in significant losses of cultural knowledge, especially detailed knowledge of local environments and resource use (e.g. Nettle and Romaine 2000: 55-77, passim). Under this view then, language shift per se plays a causal role in disrupting the transmission of cultural knowledge (Harrison 2007: 53). Despite the centrality of claims like these to public discourses on language endangerment and shift, there is surprisingly little research that directly addresses them. For example, while there is ample documentation of language loss being associated with the loss of specialized cultural knowledge, it is not entirely clear that the loss of such knowledge is a consequence of language loss, as opposed to being a simultaneous casualty of large scale sociopolitical processes that devalue and erode entire life-spheres of indigenous and minority groups around the world (Rice 2007: 319). It remains an open question if loss of cultural knowledge, for example, the ability to identify plant and animal species, occurs even in contexts of language shift where the cultural knowledge in question retains its status, value and utility. Regardless of how language shift affects culture-specific systems of knowledge, affect and expression, however, there can be no doubt that language and its relationship to culture and identity often become the objects of powerful language ideologies in contexts of language shift. The tendency for individuals to identify sociocultural groupings and their own identity by language use is sufficiently pervasive both cross-linguistically (Fishman 1999: 449) and historically (Haarmann 1999: 63-66), that the contraction or cessation of use of a language often poses an ideological predicament for group identity (McCarty and Zepeda 1999: 207-208). The sense of crisis may be especially acute in cases where a given group associates its language with cherished cultural ideas, which is widespread among human groups (Fishman 1997).

However, arguments are also made by members of affected groups for the resilience of sociocultural identity under circumstances of language shift.

8. Theoretical implications of sociophonetic studies

Sociophonetics, the interface between sociolinguistics and phonetics, and specifically the use of modern phonetic methods in quantitative analysis of language variation and change, has grown rapidly in visibility and influence over the past decade. Although its definition can be quite broad, including any sociolinguistic study involving sounds analyzed impressionistically, it usually implies the use of instrumental techniques. It has expanded from its initial purview in vowel quality to prosody, consonantal quality, and, incipiently, voice quality.

It will be apparent from the foregoing that sociophonetic data have been harvested to address a wide range of theoretical issues, reflecting the range of disciplines that have contributed to the development of sociophonetics as a field. We offer here a brief summary of the main theoretical areas of concern to sociophoneticians.

Given the historical origin of sociophonetics within sociolinguistics it is no surprise to find considerable overlap in their theoretical interests. Labov's work has always been principally concerned with providing explanations for language change: how changes originate and how they spread through grammars and communities (Labov, 1994, 2001; Milroy, 2002). Sociophoneticians have naturally focused on aspects of sound change. The contribution of sociolinguistic work in general to historical linguistics has been to complement the theoretical predictions of earlier schools, especially those of the neogrammarians and structuralists.

The claims of such schools were largely based on concepts relating to the grammatical system, such as functional load and symmetry (McMahon, 2004).

Sociolinguists have agreed that such factors may indeed contribute to determining which changes are more likely to occur, and what paths they might take. Indeed Labov's chain shift model draws explicitly on structuralist notions of the phonological system. However, sociolinguists have demonstrated that it is essential to make reference to

human communities and human interaction in order to fully understand how and why changes take place together with where and when they do. Changes operate because communities are heterogeneous, and because speaker-listeners evaluate competing linguistic forms. They recognize that variants have indexical meanings and thus that their use may be more or less attractive, appropriate or valuable in particular social circumstances. Positively evaluated variants (such as coda /r/ in American English) generally spread at the expense of their less positively evaluated rivals.

The contribution of theoretical tools from sociology, social psychology, and other neighboring disciplines cannot be underestimated in this regard. Frameworks such as social networks and communities of practice have both been imported into linguistics and have led to significant advances in our understanding of the structure of human interaction and its effects on language.

Experimental phonetics has itself made considerable advances in respect of the actuation problem, or the question of where and why a change begins. Experimental studies explain how phonetic innovations may arise as a result of the dynamic actions of the articulatory system, the effects of aerodynamic principles operating within the vocal tract, and the properties of the perceptual system. It has been shown, for example, that contrastive systems of high and low tones arise through reanalysis of fundamental frequency differences originally associated with consonant voicing, while affrication of stops is most likely to develop adjacent to close vowels because of the likelihood that vocal tract narrowing will create turbulent airflow (Ohala 1983, 1989). Such explanations are limited, however, to phonetically transparent and cross-linguistically recurrent changes. They do not explain the more arbitrary developments found in abundance in sociolinguistic studies, such as the change in English /r/ which has taken opposite paths in different parts of the English-speaking world. Labov has attempted to make sense of the apparent arbitrariness of many changes by appealing to degrees of conscious awareness of variable forms on the part of speaker-listeners. Variables may be ranked as stereotypes, markers, or indicators, in decreasing order of awareness. Different types of change may affect the different types of variable. It remains a moot point whether

phonetic forms can be shown to have universal degrees of salience, equally noticeable no matter what the community or language concerned (Docherty, 2007). Frequency effects may interact with those of social evaluation to determine the outcome of change (Bybee, 2001), as in the case of dialect leveling changes and new dialect formation (Kerswill & Williams, 2000; Trudgill et al., 2000; Trudgill, 2004). The features of new dialects, as in the case of New Zealand English, tend to be drawn from the common shared features of the contributing dialects, with minority forms becoming lost.

Sociophonetic data have made less of an impact on the main theoretical developments in phonetics and phonology. Following the pattern of Chomskyan linguistics in general, phonology and phonetics have largely pursued an active strategy of eliminating many aspects of variation, including socially structured variation, from their purview. Theories of speech production and perception have certainly made reference to variation in spoken form, but in general this has been variation connected to prosodic context, segmental environment, speech rate, etc. Phonology has likewise tended to be concerned with aspects of variation that can be considered allophonic or the subject of phonological rules or processes (depending on the terminology used in the particular model).

Chapter Two

The Kurmanji Language in Northeast of Iran

Chapter 2: The Kurmanji Language in northeast of Iran

1. Background of the Kurdish language

Kurdish is the cover term for a group of closely related west Iranian languages, spoken across a large area of the Middle East centering at the intersection of the Turkish, Iranian and Iraqi national borders. The number of speakers is variously estimated at between 20 and 40 million. Traditionally, three major dialect clusters are identified: The Northern Group, often referred to as Kurmanji (also spelled Kurmanci); the Central Group, often referred to as Sorani; and the Southern Group. In terms of numbers of speakers, the Northern Group is the largest, encompassing all the Kurds of Turkey and Syria, plus the northernmost Kurds of Iraq (Zakho, Dohuk), Kurds of west Iran around Lake Urmia, plus outliers in Azerbaijan, Armenia, and Georgia. The Central Group includes most of the Kurds of Iraq around the cities of Suleimania, Kirkuk, and Erbil, plus speakers in Iran around the cities of Sanandaj, Kermanshah and northeast of Iran.

Speakers of the Northern Group have maintained long-standing relations with speakers of many languages. Alongside the national languages such as Arabic, Armenian, Azerbaijani, Georgian, Persian, Turkish and Russian, there has been contact with numerous minority languages, for example varieties of Eastern Neoaramaic, some indigenous languages of the Caucasus, Turcoman, varieties of Romani, to name but a few. Obviously it is not possible to cover the full range of contact situations and outcomes in the space of this chapter. Instead I will focus on the Khorasani variety of Kurmanji, and restrict my analysis to the impact of the (now) major contact language, Persian.

The areas considered are northeast of Iran, where contact with Persian has traditionally been fairly strong, and where the number of other languages involved is somewhat less than in many parts of the Kurdish speech zone. Of the different local varieties considered, the Kurdish speech zone in Turkey, Syria and west part of Iran appear close enough to be identified by their respective speakers as "my dialect", but the Khorasani variety shows some distinct features which are, to my knowledge, not found elsewhere. In addition to my own data from the Persian influence on Khorasani Kurmanji, I draw on the results of other publications as well, on Kurdish–Turkish language contact in the Kurdish speech zone (Dorleijn 1996, Bulut 2000, 2005, Matras 2002, Haig 2001, 2006).

Haig (2006:283-297) reviewed briefly the sociolinguistics of Kurdish in Turkey which is extremely complex, variegated, and poorly described. "Prior to the founding of the Turkish Republic in 1923, relations between the two speech communities were not marked by any great prestige asymmetry. In fact, in the partly autonomous regions of Anatolia, Kurdish enjoyed considerable prestige as the language of many powerful landowners and religious leaders, and was learned as a second language and used as a lingua franca by speakers of many other speech communities. However, as a result of the nationalist currents accompanying the founding of the Turkish Republic, the status of Kurdish deteriorated rapidly, and the language has been officially non-existent for much of the Republic's history" (see Haig 2002a, 2004). The advent of compulsory schooling, military service, and the intrusion of mass-media to the most isolated parts of Kurdistan have led to large-scale language shift, and a drastic reduction in the number of children acquiring Kurdish fully as an L1.

Unfortunately, there is as yet no serious empirical research on Kurmanji speakers in northeast of Iran (the Khorasani variety of Kurmanji), so I am obliged to draw on the personal observations of speakers I have worked with in assessing the situation. The speakers who provided the data from which most of them has been taken are all Kurdish native speakers and bilinguals of Persian and Kurmanji.

2. The History of Khorasani variety of Kurmanji

The Khorasani Kurmanji region is found within the current northeastern borders of Iran and the southern borders of Turkmenistan, in the northern sector of what has historically been known as the Province of Khorasan. Geographical coordinates of Khorasani Kurdish region is between N(36.5–38.3)° and E(56-61)°. The area of Kurdish inhabited region in Khorasan is estimated to be about 64144 square kilometers.

The area around Lake Van in Turkey, as Kurdish inhabited regions for thousands of years has historically been one of political instability as a frontier region between major local political entities. After the Turkic invasions of the 11th century AD there was a brief unity of Anatolia and Iran under Seljuk, during which there was the junction of the major east-west and north-south trade routes. Following of the breakup of the Seljuk Empire the region became a part of the Akkoyonlu Empire (Safavid), itself a nomad dynasty. Subsequently it formed an unstable buffer zone between the Ottoman Empire and successive Persian dynasties, becoming progressively depopulated during the conflicts of the Safavid period. Although migratory Kurdish tribes were undoubtedly present in earlier times, the unstable conditions of the period following 1,600 AD brought about the strengthening of tribal affiliations and an expansion of Nomadic activity. The historical origins of the Khorasani Kurds are around Lake Van toward the city of Adiyaman in southeast Turkey on today. There is no census that records the ethnic origins of the inhabitants of Khorasan. Therefore, it is impossible to estimate the exact population of immigrant Kurds present in the total population. For a variety of reasons the national census in Iran is not trusted as a precise and democratic one, although it is not covering the issues of minorities[1].

By the beginning of the 16th century, the Shiite Safavid (Iranian) Empire had emerged as a rival to the Ottoman Empire. The Kurds found themselves in the middle of the territories claimed by the Sunnite Turkic Ottomans and the Shiite Persian Safavids. The result of the battle established a boundary between the two empires that split the

[1] http://www.iranicaonline.org/articles/iran-v1-peoples-survey

Kurds between Turkic and Persian empires. Since the 16th Century, contiguous Kurdistan has been augmented by two large, detached enclaves of (mainly deported) Kurds. These two enclaves are the Central-Anatolian enclave and the Iranian enclave, diffused in some areas especially in northeast of Iran in Khorasan province.

The Khorasani Kurdish community preserves a tradition now lost to its original home, as their deportations coincided with the destroying of the Kurdish zone by the Persian and Ottoman Empires. About more than 60,000 Kurdish families and tribes were forced to move to the Khorasan region, i.e. Northeast of Iran during Safavid Dynasty, and the reason for that was purely political. They were sent to Khorasan in order to defend the province from attacks by Uzbek and Kazakhs warriors, and also to weaken the Kurds in the Kurdish zone which their democratic demands were not in line of the ruling tyrant.

It is needless to say that the lack of state investment has left the area in destitution, undeveloped with no prosperity; about 23% of Kurmanji speakers in Khorasan were completely illiterate especially nomadic immigrants. They are not allowed to be educated in their own mother tongue, and the regional ruling officialdom is not from khorasani Kurmanji. They are not allowed to have any organized Kurdish political, cultural, educational and civil centers or forums to improve and modernize their culture, language and social affairs which are their logical basic civil rights, in Iran. Kurmanji speakers in Khorasan do not have any TV station in their language. Kurmanji tribes in Khorasan are mostly settled in regional cities and villages, although there still are some migrating nomads. There is no traditional tribal power structure anymore as a result of having a modern state government and economical system in Iran. The majority of Khorasani Kurmanji intellectuals want to preserve their culture, language and traditions within a plural society by a modern ruling style based on the UN human rights framework in the state of Iran. The majority of Khorasani Kurmanjis are Shiite Muslim. The subject of religion is rarely used by the Kurmanjis to create literature and ceremonies except by the state local rulers.

3. The history of Kurdish linguistics

3.1. European descriptive and dialectal studies

The scholarly investigation of the Kurdish language dates back to the nineteenth century when European scholars, particularly Germans, encouraged by close economic and military ties between Germany and the Ottoman Empire, under tool extensive field research in Kurdistan. The emphasis in this phase was on documenting Kurdish dialects and relating the results to the burgeoning field of Iranian philology. Among the more important investigations produced in this period are Le Coq (1903) and Makas (1897-1926). In a similar tradition are the later works of Bar (1939) and Hadank (1938). Along with the text collections just mentioned some early grammars were also produced, e.g. Fossum (1919), Justi (1880), Soane (1913) and Soane (1919). The sheer volume of material gathered by these pioneers is impressive, and its value for dialect studies, comparative and historical linguistics, language contact and many other areas is immense (cf. Haig 2008). However, there has been as yet little systematic evaluation of it outside of Iranian philology (Blau 1989, Blau 1975:12-19 for surveys of the earlier literature).

According to Haig (2008), the most influential descriptive work on Kurdish since the Second World War is undoubtedly Mackenzie (1961a, 1962), which systematically documents extensive fieldwork on Sorani and Kurmanji dialects of Iraq. Mackenzie's work can be seen as a continuation of the dialect documentations of earlier Iranian scholars, but with significant technical and theoretical improvements. First, Mackenzie based his transcriptions on tape recordings, and second, Mackenzie undertook a phonemic analysis of each dialect and based his transcriptions on a phonemic script, as opposed to the modified "Orientalist transcription" used by many of his predecessors. Although Mackenzie gathered extensive texts, his ultimate aim was not simply documentation; rather, he was concerned with a genetic classification of the dialects. The dialect classifications he proposes is certainly the most sophisticated to date within Kurdish linguistics.

3.2. Kurdish studies in the Soviet tradition

In the Soviet Union, Kudish was given attention by linguists as part of a centralized effort to complete descriptions of the numerous smaller languages of the country. Kurdish-speaking communities were dispersed within the territory of the former Soviet Union, with population centers in the various republics, most notably Armenia and Azerbaijan. The work carried out by Soviet Kurdologists was essentially descriptive in nature, and formed part of the Iranianist school of Oranskij, Edel'man, Grunberg, and others, based primarily in Leningrad. Its principal achievement could be seen as training native speakers of the language, such as Kurdoev, Bakaev, or Evdal, who became leading scholarly authorities in Kurdish from the 1950s through the 1970s, as well as the publication of a series of standard reference works on Kurdish. Perhaps the most widely-cited Soviet Kurdologist works are the Kurmanji grammars by Kurdoev (1957) and Bakaev (1957) and the comparative Kurmanji-surani grammar by Kurdoev (1978).

Another valuable source is the two volume collection of folk material in Dzalil and Dzalil (1978). While these works focus on the Kurmanji variety of Armenia, Soviet Kurdologists have also covered other dialects in Turkmenistan (Bakaev 1962), Azerbaijan (Bakaev 1965), Khorasan (Cukerman 1986), and the Mukri dialect (Ejubi & Smirnova 1968). Especially noteworthy is the Soviet contribution to Kurdish lexicography, which includes, apart from Kurdoev 1957, also a series of other dictionaries (Bakaev 1957, E'vdal 1958, Farizov 1957, Orbeli 1957).

Specialized investigation cover phonetics and morphology (Cabolov 1976, 1978) and especially verb morphology (Avliani 1962, Cukerman 1962), as well as sociolinguistic aspects of language contact (Bakaev 1962), applied research on orthography (Bakaev 1983) and Kurdish literature (Chaznadar 1967). A synthesis of much of the Soviet literature on Kurdish has recently been published by Smirnova & Eyubi (1999).

3.3. Work within a structuralist linguistic framework

Outside the Soviet literature mentioned in the previous section, probably the earliest attempts at a structuralist account of any variety of Kurdish is McCarus (1958), a grammar of Sorani written in the American distributionalist framework. Building on this, pedagogical works such as Abdullah & McCarus (1966) were also published, and McCarus (1997) gives a brief account of Sorani phonology. More recently, a number of scholars have treated aspects of Sorani within a generative framework (e.g. Sarwat 1997), and there are now several scholars based in the Kurdish universities of North Iraq working in a generative framework (Fattah 1997).

Kurmanji received comparatively little attention from structuralist linguists, partly due to the ban on the language in Turkey and Iran. A notable rare contribution is the sketch of Kurmanji phonology in Jastrow (1997). MacKenzie (1961a, 1962) gives a reliable and systematic but limited account of the phonology and morphology of several Kurmanji dialects.

3.4. Kurdish Literacy

Kurdish literacy is often impeded by social and political factors. A large proportion of the Kurdish population has only recently gained access to any form of education. State education is normally conducted in the state language and not in Kurdish, and in Turkey public use of Kurdish was until very recently directly oppressed by the government (Skutnabbkangas & Bucak 1995 on language policies in Turkey). In Iran, it is still forbidden to teach in ethnic languages, as well as Kurdish. Nonetheless, there is a tradition, or rather several traditions, of writing in Kurdish. The state of codification and standardization of Kurdish is best described in terms of three main centers of activity, the oldest and most established in the Sorani variety of the city of Suleymaniya in Iraqi Kurdistan. Prose in this dialect dates back to the nineteenth century. Under the British administration, a phonemic orthography was designed for the language on the basis of the Persian – Arabic script. In the Soviet Union, Kurdish was included among the central

Asian languages for which roman-script alphabets were designed in the 1920s, later to be converted into Cyrillic scripts during the 1940s. The latter have been employed in a series of lexicographic works as well as in a number of popular publications, based mainly on the Kurmanji variety of Yerevan in Armenia.

3.5. The Phonology of Kurmanji

The segmental phonology of Persian consists to a large extent of cross-linguistically unmarked elements, most of which are present in the phoneme inventories of the neighboring languages anyway. It is thus difficult to pinpoint phonological influence of Persian on Kurmanji. The best candidate for contact influence in the consonants is the three way voicing distinctions in initial stops (Haig 2004). There is little evidence for the transfer of Persian vowel harmony into Kurmanji. Syllable structure in Kurmanji is somewhat more constrained than in Persian, especially initial consonant clusters, but vowel epenthesis and consonant deletion are the usual strategies for breaking up consonant clusters, as it is in Persian.

Kurdish phonology does show features that bespeak of contact influence. For example, as mentioned above, Kurmanji exhibits a three-way distinction among the stops – between voiced, voiceless aspirated, and voiceless non-aspirated – giving rise to a Caucasus-style three-way stop distinction. There is some disagreement, as to whether the relevant phonetic parameter is ejective vs. non-ejective (according to some Soviet authors) or voice–onset time (MacKenzie 1961; Kahn 1976), or both (Jastrow 1997). There is also disagreement on its origin; Haig (2007) considers it contact influence from Armenian the most likely source. However, this three-way stop distinction impresses with the strong influence of Persian phonology; and their functional load is very limited in younger generations.

This brief overview presents feature common to Kurmanji, but notes significant differences where relevant. The principal features of the sound system include fluctuation in the rounding of the short closed vowels /i/ and /u/, as well as frequently interchanging articulations in closed vowels between front, back, and central, and a tendency toward

syllable reduction around unstressed short closed vowels. The vowel system is relatively simple though there is considerable variation in vowel qualities across dialects. Characteristics of the Kurdish system of consonants is the trill/flap opposition /r: ɾ/. Also typical is the borrowing of phonemes from the contact languages. The velar fricative /ɣ/ and the uvular stop /q/ are shared with other Iranian and Turkic languages as well as with Arabic, while the glottal stop /ʔ/ and pharyngealized /h/ are borrowed from Arabic (Kahn 1976). A characteristic feature of Kurmanji, but lacking in most varieties of Sorani, is phonemic aspiration in the voiceless stops (including the affricate $tʃ^h$). Some authors have pointed out that this is an areal feature shared with Armenian and other languages. Some of the borrowed consonant phonemes have diffused into the inherited (Iranian) component of the lexicon, e.g. the numeral 7 /haft/ with pharyngeal /h/.

Like other west Iranian languages (e.g. Persian), Kurdish syntax is typologically non-harmonic in its constituent order: it has modifier-head order in the clause (i.e. verb-final), but head-modifier order in the noun phrase. One of the most conspicuous features of the noun phrase is the Iranian Izafe construction, a synthesized relativiser that follows the head and mediates between it and its modifiers (genitive or adjectival dependents). A typologically unusual feature of Izafe construction is that they constitute islands as far as nominal case is concerned: Within an Izafe, case cannot be expressed on the head noun, i.e. the feature [case] is neutralized in the Izafe construction (with the exception of case marking on pre-head determiners). The Izafe inflection in Kurmanji is inflected for gender, number, and definiteness. Kurmanji is, on the whole, more conservative in retaining both case and gender opposition (masculine: feminine).

In the structure of the clause, Kurdish is closely related to Persian and other Iranian languages. The default of word order is OV, while indirect objects and goals of verbs of motion generally follow the verb. Demonstratives and numerals precede the head, while attributes, possessors, and relative clauses follow it. The inventory of conjunctions consists of interrogatives, grammaticalized nominal and local expressions, as well as borrowings deriving ultimately from Arabic, which tend to form part of a pool

of conjunctions shared by a number of languages of the Middle East and Western and Central Asia (cf. Matras 2000:279, Haig 2001). The most conspicuous is the multifunctional *Ku/ko* which figures as a general subordinator introducing complement, relative, temporal adverbial and conditional clauses, and supporting other semantically more specialized conjunctions. Kurdish lacks non-finite clausal complements; the infinitive is a nominal category, while modal complements and purpose clauses are always finite, with the verb appearing in the subjunctive.

4. Selected issues in recent Kurdish linguistics

4.1. Language contact

A very common pattern of interethnic contact, probably the most common, is that of contact between members of a minority ethnic group and members of the socially dominant ethnic group. If the two groups have different linguistic varieties, one might look for there to be some influence between them, depending on the social context. Since the dominant variety is the one that will be privileged in the school system, attempts may be made to impose it on speakers of other varieties. We know from decades of sociolinguistic research, however, that language corresponds strongly to identity, and that it is not easy to mandate how an individual will speak (barring draconian measures such as making it illegal to speak a particular language or variety). In situations where the social context favors multiple interethnic contacts, however, some speakers who identify with minority ethnic groups may choose to incorporate features from a dominant variety into their speech (and vice versa, although this latter possibility will be limited by the fact that the minority variety is usually socially disfavored). Again, the particular social and linguistic ideologies at work will affect the degree and nature of linguistic assimilation. Conversely, studying the patterns of linguistic assimilation can illuminate the complex nuances of social structure within a community.

Kurds have lived for centuries in a multi-lingual environment, engaging in close contact with speakers of Arabic, Armenian, Persian, New Aramaic and Turkish. Not

surprisingly, these contacts have left their mark on the Kurdish language. Language contact has generally not been a central issue for scholars of Iranian philology, but it has been taken up by a number of linguists recently. Probably the first person to look at the effects of language contact in its own right was Kahn (1976). Her thesis not only provided a detailed and reliable sketch of the phonology of a variety of Kurmanji spoken in Iran, but also contains highly innovative discussion on language contact in the Kurdish context. She concludes that variation is not simply a matter of performance, which can be abstracted a way from in phonemic analysis. Rather, deployment of different phonetic variants is part and parcel of a specific Kurdish type of competence which has evolved in an environment where multi-lingualism is the norm (see also Bakaev 1962 for a more traditional Soviet perspective).

More recently language contact has become a major area for research into Kurdish. Dorleijn (1996) is the first book-length treatment of contact effects on syntactic phenomena and as such is of considerable importance. Specifically, she examines the effects of Turkish influence on the Kurmanji ergative construction. In doing so, she reveals that for many variants spoken in Turkey, the canonical ergative construction espoused in most grammars and pedagogical works is something of myth. In particular, she suggests that in the variant spoken around the town of Diyarbakir, the canonical ergative construction has been almost entirely abandoned on favor of other types of construction, especially the double-oblique construction familiar from Payne (1980). The question as just how Turkish influence may have contributed to this development remains, however, ultimately, unresolved.

More recent work on language contact has extended the data base to languages other than Turkish (Chyet 1995, Matras 1998) and examines the issue of whether East Anatolia qualifies as a linguistic area (Haig 2001). Bulut (2000) explores the issue of whether Kurdish has adopted evidentiality as a verbal category, while Haig presents data from one highly contact-affected variety of Kurdish from the periphery of the Kurdish speech zone.

The Kurmanji speakers of modern Turkey have been under Ottoman and Turkish dominance of centuries, and it is therefore not particularly surprising that Kurmanji shows many traces of Turkish influence. Furthermore, Kurmanji in Iran boundaries encounter with a strong influence from Persian. However, the precise extent of that influence is only poorly understood due to the lack of reliable data. In this study I will present data from Kurmanji variety spoken in northeast of Iran, Khorasan Province, which is highly influenced by the dominant Persian and never studied beyond all Kurmanji varieties in Turkey boundaries. In keeping with the theme of this study, the focus is on those features where Persian influence appears to be most evident, and which have not been discussed elsewhere in the literature (Zirak and Skaer, 2013b).

Assessing the degree of contact influence in any language is always a delicate matter, for it involves comparing the supposedly contact-induced form with some postulated "pure" corresponding form. In the case of Kurdish, isolating a neutral "norm" is particularly difficult. The Kurds do not constitute a stable, homogeneous, isolated community of ideal speakers/hearers: Kurds have always coexisted with speakers of other languages; they are traditionally mobile (and even more so now) and are notorious polyglots. Multilingualism and a fluid standard are thus intrinsic to the Kurdish speech community, a fact that was pointed out with great clarity by Kahn (1976:2-7). It is therefore difficult to find a norm against which contact influence could be gauged. Furthermore, as the Turkic and Iranian language families have been influencing each other for centuries, disentangling a pure genetic core from contact influence is made more difficult still (Johanson 2002).

While there are numerous examples of the dominant variety of a region influencing speakers of a minority ethnic variety, there has been relatively little research on possible influences in the other direction. Given that varieties associated with minority ethnic groups are often subject to negative social evaluation, we might expect a low degree of influence from these varieties onto the more prestigious dominant variety.

4.2. The generation gap

The two main causes of change in minority languages, incomplete acquisition and declining use, often lead to structural and stylistic attrition. So-called attrition studies have been carried out by researchers concerned with the process of language shift as well as by those interested in second language acquisition. Detailed studies dating from the 1980s have aimed at identifying areas of language particularly susceptible to change, the rate at which change occurs, and establishing correlations between linguistic change and social variables (e.g. age, gender, etc.). Some key questions are whether it is possible to distinguish between internally versus externally motivated change, and between changes that are universal or specific. Dorian (1977) originally gave the term "semi-speaker" to individuals who failed to develop full fluency and normal adult proficiency. Some spoke the language, but with deviations from fluent older speakers. Others seldom spoke the language, but nevertheless had good passive competence. Semi-speakers tended to substitute more analytic structures for synthetic ones, to analogically level irregularities, and to have fewer stylistic options or registers. Structural reduction goes hand in hand with stylistic reduction, which is intimately connected to functional restriction as limited productive competence in minority language forces terminal speakers to depend more and more on fixed phrases and less on creative new utterances. Stylistic shrinkage may proceed from top down (i.e. formal or high registers) or bottom up (Campbell & Muntzel 1989:185). In cases where the minority language is restricted to ceremonial or school use, informal, everyday styles may be reduced or nonexistent. Alternatively, restriction to the domestic sphere and informal in-group settings involving networks of family and friends often results in young people's failure to acquire forms appropriate for more formal contexts. This is one reason why second-generation speakers of immigrant languages such as German, French, Italian, and Spanish with so-called T/V[2] systems of address that

[2] In sociolinguistics, a **T–V distinction** is a contrast, within one language, between second-person pronouns that are specialized for varying levels of politeness, social distance, courtesy, familiarity, age or insult toward the addressee. Languages such as modern English that, outside of certain dialects, have no syntactic T–V distinction may have semantic analogues to convey the mentioned attitudes towards the addressee, such as whether to address someone by given or surname, or whether to use *sir* or *ma'am* in American English. Under a broader classification, **T** and **V** forms are examples of honorifics.

index familiarity and intimacy (e.g. *tu* in French, Italian, Spanish) versus formality and distance (e.g. French *vous*, Italian *Lei,* Spanish *Usted*) tend to overuse the familiar forms. The fact that this distinction is not matched in English (which has only socially unmarked you) may also be a contributing factor in the overgeneralization of familiar forms. Some detailed examples of changes in dying languages follow with reference to some typically affected areas of linguistic structure such as lexicon, phonology, classifier systems, pronominal systems, case marking, and syntax.

Added to the weakening of Kurmanji in specific domains in which they were once strong, there is a further general dimension of weakening which extends throughout the community as a whole. This is the failure of the younger speakers to benefit, as previous generations did, from intercourse with the oldest generation of speakers precisely those speakers who normally have the widest range of linguistic skills within the community, save in respect of literary speech and modern technical vocabulary. The reasons for this relate largely to the phenomenon known popularly as "the generation gap"; the acquired wisdom of such old folk is not generally highly regarded by modern young people whose preoccupations lie mainly outside the scope of these old people's experience and who also may lead much of their daily lives in Persian. Furthermore, as more and more of the older generation die off, taking with them many untransmitted items in the local store of language, the dialect of the area must become increasingly monochromatic. Even traditional greetings and blessings are often unfamiliar nowadays to younger speakers in many of the Kurmanji speakers, in my experience.

A number of factors noted above have cumulative effect, that of restricting the modern speakers' level of functioning in Kurmanji: The constant thinning-out of the speech community, especially the oldest generation of speakers with the widest linguistic range; the tendency for increasing numbers of speakers to opt for use of Persian in everyday speech; and the gradual erosion of native-language vitality even in domains where traditionally it was strong. In some cases this progressive restriction can bring modern speakers to the point where only a limited selection of topics can be discussed satisfactorily by them in their own mother tongue. Thus, whenever a subject is more

complicated than the weather, community news, or basic farming or fishing is raised, individuals can be heard switching over into Persian in order to deal adequately with it.

Most indigenous languages spoken in Iran possess words of Arabic and Persian origin that have partly superseded the native language vocabulary. Persian lexical influence, which also includes Arabic words introduced via Persian, has been very strong in all languages of the Islamic world, covering various domains of Islamic culture and representing both abstract and concrete concepts pertaining to Oriental urban life. They represent all fields of traditional Islamic society. Numerous loans are found in modern Azeri, Khorasani Turks, southern Kurdish, Balouchi, Turkmen, Uzbek, as well as Khorasani Kurmanji among them. Khorasani Kurmanji displayed an overwhelming number of Arabic-Persian loans, which ousted a considerable part of the native vocabulary. Kurmanji has preserved numerous words of Arabic-Persian origin. It also possesses numerous copies from spoken Persian.

5. Conclusion

Even a language once fully acquired may recede from active recall if no longer used. Disuse creates a vicious circle of attrition (Romaine 2010). As speakers forget more and more of it, it becomes difficult to recall the old words, especially when some of the things they referred to have become obsolete because they are related to traditional customs no longer practiced. Romaine (2010) argued that the process of attrition can take place in situ as well as in immigration contexts, where the language in question is still used elsewhere. “In both types of settings changes are rooted in the transmission process. Traditional community and family structures and practices once supporting the transmission of language and culture have weakened (Romaine 2010).” Major changes in socialization patterns have made the formerly normal process of acquiring languages at home the exception rather than the rule. The older generation may be largely monolingual, not ever acquiring the dominant language well, and the youngest generation may likewise be monolingual, but in the dominant language rather than the parents’ native language. Even where monolingual first-generation parents speak their language at home, their

children are exposed to the dominant language through older siblings and playmates. Thus, by the third (and sometimes even second) generation, immigrants are generally dominant in the official language of the state they live: the minority language, if they can speak it at all, reveals signs of incomplete acquisition, attrition, and influence from the dominant language.

Despite centuries of coexistence of Persian and Kurdish speakers in Iran, the core grammars of Kurmanji and Persian have remained quite distinct: Constituent order in the NP, inflectional morphology, gender system, alignment in past tenses, and means of subordination. The changes generally involve a loss of constructional variants, or changes in the frequency of constructional variants, rather than the introduction of completely new structures, either through matter or pattern borrowing. It is a simple fact that all the changes noted result in the structure that is significantly closer to that of Persian. What we have then is the cumulative effect of small changes, each of which serve to push the entire grammar a little further in a certain direction. This type of gradual, cumulative change may be typical for the type of long-standing coexistence on more or less equal footing that characterized Persian–Kurmanji language contacts up to the beginning of the twentieth century.

For example, code-switching and early Kurmanji–Persian bilingualism may well have been quite unusual among the rural population in the past 50 years among old generations, so one might expect the contact outcome to be quite different to that found in, for example, very small and threatened minority languages surrounded by a dominant language, where bilingualism has been the norm for an extended period. The Kurmanji data nevertheless show the results of very intensive borrowings, possibly reflecting the region's relative proximity to the Persian speaking, but this needs closer monitoring.

While the present study is based on data from speakers from two generations, it seems likely that the speech of the younger generation, who have attended Persian-speaking schools and have had early exposure to Persian mass media, will differ significantly in the type and extent of borrowing.

These issued go well beyond the scope of the present study. My primary aim here is to present the original data, from two generations of Khorasani variety of Kurmanji with illustrative examples of particular contact phenomena. As a rough means of assessing the extent of contact influence, the Khorasani variety is compared to the dominant Persian which has a strong influence on the target language. The data suggest that the most heavily Persianized Kurmanji varieties are those of the northeast of Iran, i.e. the area where the ratio of Persian speakers relative to Kurmanji speakers is much higher. However, in view of the sketchy material available for most of the dialects, I will refrain from too much theorizing and let the data speak for themselves.

In the absence of more data, especially from the northern and western parts of the Kurmanji speech zone, it would not be prudent to draw any firm conclusions. The only ones that suggest themselves to the present study are: (a) the Khorasani Kurmanji is one of the most strongly Persianized dialects for which material is available; (b) the Khorasani Kurmanji may be typical for the Kurmanji dialects spoken in the northeast of Iran, which is completely out of Kurmanji speech zone, characterized by very heavy Persian influence; (c) in this respect they differ from the dialects spoken in the Kurmanji speech zone, i.e. the dialects from southeast Anatolia, on which Standard Kurmanji is ultimately based; (d) Kahn's (1976:6) suggestion that "the newer influence of dominant languages, i.e. the official languages of the states that Kurds inhibit, may be taking precedence over older dialect (tribal) divisions" may be an accurate assessment of regional differences between Kurmanji dialects.

Chapter Three

The Contrastive Study of VOT in Kurmanji and the Dominant Persian

CHAPTER 3:
A Contrastive Study of VOT in Kurmanji and the Dominant Persian

1. Introduction

Sound changes in a language are considered nearly inevitable consequences of language death. The literature on sound change in obsolescing languages has focused on whether the changes are internally or externally motivated, between convergent and divergent change and, therefore, the difference between categorical sound shifts and gradient phonetic effects has been overlooked. This chapter examines the acoustic correlates of voicing distinctions in the Kurmanji language that investigate the subphonemic variation within a category. The results of a cross-generational acoustic study of Kurmanji showed that unaspirated initial voiceless stops have undergone phonetic change convergent with Persian, the dominant language.

This chapter argues that sound change in obsolescing languages may manifest substitution or approximation/expansion of phonological categories in the moribund language. When we consider language contact phenomena, both social and structural factors must always be taken into account (Weinreich, 1958). Social factors influencing mechanisms and outcomes include the reason for the language contact, the dominance of the group speakers, the amount of social and cultural pressure groups exert on each other, and the relative instrumental value of the languages. Instrumental value is a measure of how useful the language is for the economic and social advancement of the speaker (O'.Shannessy, 2011).

Language change may occur as a result of external influence from a dominant language in the community, or internally-motivated change by virtue of its independence from the influence of the dominant language (Chang, 2007). As (Chang, 2007; Dorian, 1993) caution, when change is externally motivated, the obsolescing language may come to approximate features of the dominant language, on the other hand, external influence may cause salient features of the obsolescing language not found in the dominant language, thus further differentiating the two languages. To sum up, externally motivated change may result in either convergence with or divergence from the dominant language (Chang, 2007; Dorian, 1993; Labov, 2011). In the same direction, internally motivated change may incite the features that cause convergence with or divergence from the dominant language. Whether or not the change is convergent or divergent depends upon the nature of languages in contact. Chang (2007) states that it is likely for a language to be undergoing changes due to internal pressures at the same time that it is being affected separately by contact with another language. Most endangered language situations involve gradual decline in speaker numbers and speaker fluency.

Increasing convergence across the phonetics/sociolinguistics divide has not only led to the development of new integrated theoretical positions (Docherty and Foulkes 2006; Pierrehumbert and Clopper 2010), but has also opened up a wider range of explanatory accounts for observed patterns of variation, with the emphasis on ensuring that variation which is attributed to social factors might not be a secondary consequence of some other phonetic factor (and vice versa). Large-scale investigations on sound change in obsolescing languages are notably lacking for some languages, in particular the Iranian group. Following recent investigations of obsolescing languages such as Babel (2008) we present a study of phonetic and phonological changes in Kurmanji speakers of northeast of Iran based upon recordings of two generations of speakers.

In this chapter I also consider another case where similar considerations must apply: variation in voice onset time (VOT) (Cho and Ladefoged 1999; Docherty 1999; Lisker and Abramson 1964) for voiceless stops across young and old generations. This chapter focuses on the realization of a sound change to investigate whether these changes

are gradual shifts or categorical changes resulting in either convergence with or divergence from the dominant language, Persian. The phonological contrasts of initial voiceless consonants were examined in order to determine the differences of voice onset time as a phonetic correlate of a voicing distinction, and investigates the question: What evidence is there of VOT values of the initial voiceless consonants in the Kurmanji speakers on the process of language change regarding interference from the strong dominant language, Persian?

Recent studies of phonological variation in Iranian languages, especially the Kurdish varieties, have not focused on VOT variation regarding the change based upon social and structural factors, like what was reported for other minority languages. Although there are reports (e.g. Bijankhan and Nourbakhsh, 2009) of Modern Persian suggesting that voiceless consonants displayed no significant sex differences for VOT values, there are no comparative accounts for VOT in Iranian minority languages vs. the dominant languages considering the social and structural factors. Within this study, analysis of a range of other variables has brought to light a number of parameters where there are significant age-related differences within a particular location, and has also pointed to different levels of permeability from the dominant language attributable at least in part to prevailing language ideologies. Given this context, the present study investigates the patterning of VOT across the two generations concerned with the aim of examining the complex interaction between phonetic and social factors in the realization of a phonological variable. More specifically, this chapter addresses the following questions:

1- Is there a systematic variation in the voice onset time (VOT) values for the two types of Kurmanji voiceless initial stops: /p, t, k/ and /p^h, t^h, k^h/ ?
2- Do intergenerational factors and the dominant language play a role in characterizing the observed variation?
3- What is the degree of change in the observed variation between the two generations? Is it gradual shifts or categorical changes?

4- Can we support the position that the sound change results in either convergence with or divergent from the dominant language?

2. Explanations of VOT distinctions

The phonological distinction between voiced and voiceless obstruents has been one of the most studied distinctions in many of the world's languages. Different scholars consider different features for the description of the contrast of type /b d g/ ~ /p t k/. Jakobson & Halle (1956) used [±voice] and [± tense] as distinctive features. Lisker & Abramson (1964) described the contrast with a single phonetic feature, Voice Onset Time (VOT). In their view, this feature not only separates voiced from voiceless stops, but also distinguishes aspirated from unaspirated stops. The noise feature of aspiration is simply regarded as the automatic concomitant of a large delay in voice onset. Trubetzkoy (1969) considered three phonetic features [±voice], [±tense] and [±aspirated]. Chomsky & Halle (1968: 327) did not share Lisker & Abramson's view that voicing implementation controls the timing of the onset of vocal cord vibration. In their universal set of distinctive features, Chomsky & Halle (1968: 328), however described the voicing contrast with four binary features, [±voice], [±tense], [±glottal constriction] and [± heightened subglottal pressure]. Ladefoged (2006: 268–275) described two feature systems for voicing contrast. One of them uses values of the features Glottal Stricture and Glottal Timing and the other one the binary features [±voice], [±spread glottis] and [± constricted glottis]. Since Lisker & Abramson's pioneering study, many languages have been investigated and the generality of VOT as an important factor has been confirmed. Now, there is abundant evidence that stop pairs at the same place of articulation are distinguishable on the basis of voice onset time (Lisker & Abramson 1964, Stevens & Klatt 1974, Klatt 1975, Lisker 1975, Yeni-Komshian, Caramazza & Preston 1977, Keating, Linker & Huffman 1983, Keating 1984). One of the major outcomes of these investigations is that there is language-specific variation with respect to VOT.

Many experimental studies have investigated the phonetic basis for the voicing distinction. Lisker (1986) discussed sixteen acoustic features signaling voice distinction. In her licensing by cue approach to phonology, Steriade (1997: 6) listed the acoustic properties that influence the perception of voicing categories and are therefore to be treated as cues to voicing distinction. These parameters are closure voicing, closure duration, V1 duration, F1 values in V1, burst duration and amplitude, VOT values, and F0 and F1 values at the onset of voicing in V2.

VOT has been defined as the time interval between the onset of release burst and the onset of periodicity that reflects laryngeal vibration (Lisker & Abramson 1964: 422). By convention, zero is assigned to voicing which occurs simultaneously with the moment of stop release, negative values to voicing before the release (voicing lead) and positive values to voicing starting after the release (voicing lag). Lisker & Abramson found a three-way distribution of VOT values for initial stops of eleven languages. These three potentially contrastive categories were defined as follows (Lisker & Abramson 1964, Abramson 1977):

- Fully voiced stops produced with a negative VOT value (VOICING LEAD)
- Voiceless unaspirated stops produced with zero or a slightly positive VOT value (SHORT LAG)
- Voiceless aspirated stops produced with a clear positive VOT value (LONG LAG)

The way in which the voicing distinction is implemented phonetically using VOT is different across languages (Keating et al. 1983, Keating 1984). We follow Keating (1984, 1990) who proposed a model in which there are two levels of representation: phonological and categorical phonetic representation. At the phonological level, the contrast between /b, d, g/ and /p, t, k/ pairs is defined by the phonological feature [± voice] in all languages demonstrating this opposition. At the second level, the binary phonological feature values will be implemented as categories chosen from a fixed and universally specified set: {voiced}, {voiceless unaspirated}, and {voiceless aspirated}.

These abstract categories correspond directly to the above division of the VOT continuum into lead, short-lag, and long-lag which are further realized as articulatory and

acoustic parameters represented continuously in time (Keating 1984). Keating (1990) reanalyzed this categorical phonetic representation and considered a non-continuant segment to project two aperture nodes in sequence. The first is the closure with a stop aperture while the second is the release of the closure and may have either a fricative or an approximant aperture. The feature [voice] under the closure node distinguishes phonetically voiced from voiceless closure intervals. If vocal cords vibrate during the interval of a stop closure, the value of this feature will be positive. The feature [spread glottis] under the release node distinguishes aspirated from unaspirated stops. Hence, [+spread glottis] refers to an open position of the vocal cords resulting in aspiration, whereas [-spread glottis] refers to a closed position which will result in no aspiration. In many languages with a two-way voice distinction, voiced or voiceless phonemes might have different phonetic features in different positions or contexts. The same picture is true when we are dealing with different languages. Keating (1984: 291) believes that this framework allows us to always treat the stops of two languages as phonologically identical, though they may be different phonetically. She also believes that various languages use all possible combinations of a universal set of phonetic voicing categories in their implementations of [±voice]. The choice of implementation rules must be specified for each context in each language, since there seems to be no way to predict categories across environments (Keating 1984: 315). Among the languages which contrast [+voice] and [-voice] in initial position, some of them, such as English, Danish, and German, choose {vl.unasp.} and {vl.asp.} (i.e. voiceless unaspirated and voiceless aspirated, respectively). Other languages, such as French and Spanish, choose {voiced} and {vl.unasp.}, and a few languages, such as Turkish and Swedish (Beckman & Ringen 2004, Ringen & Helgason 2004), choose {voiced} and {vl.asp.} phonetic categories to implement the phonological contrast in initial position.

It is well-known that the phonetic interpretation of what is sometimes loosely referred to as 'voicing contrast' is subject to positional, dialectal, and cross-linguistic variation. In the broad literature on English VOT, it has been shown that VOT varies with a number of factors, including linguistic factors (place of articulation, identity the

following vowel and speaking rate), and non-linguistic factors (age, gender and other physiological characteristics of the speaker). Voice onset time (VOT) is the duration between consonant release and the beginning of the vowel. English voiceless stops (i.e. [p], [t], and [k]) typically have VOT durations of 40ms – 100ms (Forrest et al., 1989; Klatt, 1975; Lisker & Abramson, 1964). For example, utterance initially and in post-obstruent contexts, many dialects of English contrast a series of long lag VOT (conventionally >35 ms) or 'voiceless aspirated' plosives [p^h, t^h, k^h] with a series of plosives that sometimes have a negative VOT, but more often have a short lag positive VOT (<35 ms). Word medially, the first series retains its long lag VOT in the onset of stressed syllables, but in the onset of unstressed syllables the amount of VOT often decreases to within the short lag bracket. The second series may be partially or wholly voiced in medial context, depending, among other things, on the phonetic context. Languages such as French or Polish on the other hand, contrast a series of short lag VOT stops with a series of negative VOT or 'prevoiced' stops across initial and medial contexts (see Keating (1984) for one of the principal instrumental studies on this topic).

The most well-studied factor in VOT variation is the place of articulation. It has been confirmed in various studies that VOT increases when the point of constriction moves from the lips to the velum, both in isolated word reading and read speech (Zue, 1976; Crystal & House, 1988; Byrd, 1993; among others), and this pattern is not limited to the English language (Cho & Ladefoged, 1999). Speech rate is another conditioning factor. Kessinger and Blumstein (1997, 1998) reported that VOT shortened when speaking rate increases (also see Volaitis & Miller 1992, Allen et al. 2003). It has also been proposed that phonetic context, in particular, the following vowel, has an effect on the length of VOT. Klatt (1975) reported longer VOT before sonorant consonants than before vowels. Klatt also found that voiceless stops typically had longer VOTs when followed by high, close vowels and shorter VOTs when followed by low, open vowels (also see Higgins et al. 1998). In addition, there is also an indirect influence from the following vowel context in that some VOT variation patterns are only observed in certain vowel environments (Neiman et al. 1983; Whiteside et al. 2004). A different line of

research on VOT variation focuses on non-linguistic factors. Whiteside & Irving (1998) studied 36 isolated words spoken by 5 men and 5 women, all in their twenties or thirties, and showed that the female speakers had on average longer VOT than the male speakers. The pattern was confirmed in several other studies (Ryalls et al. 1997; Koenig, 2000; Whiteside & Marshall 2001). Age has also been suggested as a conditioning factor of VOT. Ryalls et al. (1997, 2004) found that older speakers have shorter VOTs than younger speakers, though their syllables have longer durations. A tentative explanation is that older speakers have smaller lung volumes and therefore produce shorter periods of aspiration (see also Hoit et al., 1993). However, no age effect is found in some other studies (Neiman et al., 1983; Petrosino et al., 1993). Other non-linguistic factors that have been studied include ethnic background (Ryalls et al. 1997), dialectal background (Schmidt and Flege, 1996; Syrdal, 1996), presence of speech disorders (Baum & Ryan, 1993; Ryalls et al 1999), and the setting of the experiments (Robb et al., 2005). Last but not least, at least part of the VOT variation is due to the idiosyncratic articulatory habits of the speaker. Allen et al. (2003) show that after factoring out the effect of speaking rate, the speakers still have different VOTs, though the differences are attenuated.

2.1. Variations and Universals in Voice Onset Time (VOT)

When a pattern recurs in hundreds of languages it may seem inevitable. For example, many phoneticians have noticed that vowels are usually longer before voiced than before voiceless stops (Halle & Stevens, 1967; Chen, 1970; Lisker, 1974; Maddieson & Gandour, 1977; Maddieson, 1997*a*). It is also a common observation that high vowels in stressed monosyllables are shorter than low vowels in comparable syllables (Lindblom, 1967; Lehiste, 1970; Lisker, 1974; Westbury & Keating, 1980; Maddieson, 1997*a*). But neither of these patterns is inevitable. A language that at one time had a contrast between long and short vowels could lose this contrast and keep just the long high vowels and the short low vowels. A language of this kind might be slightly more difficult to learn, but it would not be impossible.

There are, however, other kinds of phonetic events that have inevitable consequences. Whenever the tongue goes from a raised position in the front of the mouth to a low position in the back, the frequency of the first formant will go up and that of the second formant will go down. Similarly, if there is no compensatory adjustment, stretching the vibrating vocal folds will always raise the pitch of a voiced sound. Again, other things being equal, whenever a contraction of the internal intercostal muscles occurs to produce a stressed syllable, then the syllable will have a higher pitch and an increase in loudness (Cho and Ladefoged, 1999).

In discussing phonetic universals we should keep these two kinds of phonetic events distinct. It is physically impossible to move the tongue from a high front to a low back position without raising F1 and lowering F2. It is perfectly possible to reverse the usual vowel length differences between high and low vowels, although the resulting gestures may be more difficult to make. In this chapter, we will discuss differences among aspirated and unaspirated stop consonants as reflected by variations in voice onset timing (VOT). We will mainly be concerned with variations in VOT due to place of articulation, and will consider which, if any, of these variations are inevitable consequences of some physiological adjustment, and which are simply the most favored (perhaps the easiest) articulatory gestures.

It is well known that VOT varies to some extent with place of articulation. Cho and Ladefoged (1999) accounted the principal findings which that: (1) the further back the closure, the longer the VOT (Fischer-J$_{Ø}$rgensen, 1954; Peterson & Lehiste, 1960); (2) the more extended the contact area, the longer the VOT (Stevens, Keyser & Kawasaki, 1986); and (3) the faster the movement of the articulator, the shorter the VOT (Hardcastle, 1973). These patterns have been known for many years. They can be observed in Lisker and Abramson's (1964) classic crosslinguistic study of VOT- although they themselves did not go into details concerning variations of VOT conditioned by place of articulation (Cho and Ladefoged, 1999). Tables 3.1 and 3.2 show that, in their data, velar stops always have a longer VOT. Furthermore, Cho and Ladefoged (1999) based on Lisker and Abramson’s (1964) results conclude that in both aspirated and unaspirated stops, VOT is

shortest before bilabial stops and intermediate before alveolar stops, with the exception of the unaspirated stops in Tamil and the aspirated stops in Cantonese and Eastern Armenian.

Table 3.1. Summary of VOT (ms) in unaspirated stops reported by Lisker & Abramson (1964:208)

	Dutch	Puerto Rican Spanish	Hungarian	Cantonese	Eastern Armenian	Korean	Tamil
/p/	10	4	2	9	3	18	12
/t/	15	9	16	14	15	25	8
/k/	25	29	29	34	30	47	24

Table 3.2. Summary of VOT (ms) in aspirated stops reported by Lisker & Abramson (1964:208)

	Cantonese	English	Eastern Armenian	Korean
/p^h/	77	58	78	91
/t^h/	75	70	59	94
/k^h/	87	80	98	126

In early forms of generative phonology, such patterns were considered to be attributable to low level (automatic) phonetic implementation rules, constrained by physiological (biomechanical) factors, and thus not a necessary part of the grammar of any one language. This is the view expressed by Chomsky & Halle (1968) in the *Sound Pattern of English* (SPE). In SPE, for any given language, once binary features have been converted into scalar featural values, the physical output is completely determined by universal phonetic implementation rules.

It has also been known for many years that the SPE view is not correct, and that there are language specific phonetic rules which must be part of the grammar of each language (Pierrehumbert, 1980, 1990; Keating, 1984, 1985, 1990; Fourakis & Port 1986; Cohn, 1993, among others). In particular, Keating (1985) convincingly shows that three assumed phonetic universals - intrinsic vowel duration, extrinsic vowel duration, and voicing timing - are not automatic results of speech physiology. They are not universal attributes of sounds, but are at least in part determined by language specific rules. Docherty (1992) reaches a similar conclusion with respect to VOT in British English.

There have been several recent reports of variations in VOT, the most important being those of Cooper (1991*a*, 1991*b*), Docherty (1992), and Jessen (1998). These studies present data on VOT in many different contexts, but in each case the comparable data are limited to a single language (Cooper on American English, Docherty on British English, and Jessen on German).

2.2. VOT variations due to the place of articulation

There have been several explanations in the literature for the general voice onset differences found in the studies reported above. These explanations depend on a number of factors, including laws of aerodynamics, articulatory movement velocity, and differences in the mass of the articulators. In addition, there is an alternative analysis that suggests there is a temporal adjustment between stop closure duration and VOT (Weismer, 1980; Maddieson, 1997a).

2.2.1. The relative size of the cavity at the point of constrictions

Many phoneticians (e.g., Hardcastle, 1973; Maddieson, 1997a) have suggested that one of the factors which contribute to VOT differences is the relative size of the supraglottal cavity behind the point of constriction. Cho and Ladefoged (1999) considered the two ways to describe this point of view: Firstly, the cavity behind the velar stop has a smaller volume than that behind the alveolar or bilabial stops. Secondly, the cavity in front of the velar stop has a larger volume than that in front of the alveolar or bilabial stops.

From the first point of view, Cho and Ladefoged (1999:209) states that "the notion that the cavity behind the velar stop has a smaller volume than that behind the alveolar or bilabial stops, it may follow that the velar stop has a greater pressure behind it at the beginning of the release phase. During an utterance, the air is compressed by the action of the respiratory muscles. If the volume being compressed is small, a given reduction in size will produce a greater increase in pressure. As a result the air pressure in the vocal tract may be higher for a velar stop. If this is so, it will take a longer time for the pressure

behind the closure to fall and allow an adequate transglottal pressure for the initiation of the vocal fold vibration".

The second point of view considers the fact that there is a larger body of air in front of the velar stop which will act like a mass that has to be moved before the compressed air behind the velar closure. Irrespective of whether there is or there is not a higher air pressure behind velar closures, the drop in the pressure of the air in the vocal tract will be slower for velars, again resulting in more time to attain the crucial transglottal pressure difference required for voicing (Cho and Ladefoged, 1999).

2.2.2. Articulatory Movements

Hardcastle (1973) postulates that the voice onset difference can be due in part to the fact that the tip of the tongue and the lips move faster than the back of the tongue. This notion is supported by a cineradiographic study of VC and CV articulatory velocities by Kuehn & Moll (1976), who report that **the articulatory movement** is fastest for the tongue tip, intermediate for the lower lip, and slowest for the tongue body (Cho and Ladefoged, 1999). This may be partly due to the volume of the articulators involved; the tongue tip is smaller and lighter than the lips or the body of the tongue. Cho and Ladefoged (1999:210) claims that this difference may be also due to the fact that jaw movements affect lip and tongue movements in different ways; "tongue dorsum movement is least affected by jaw movement, while lower lip movement is accelerated by jaw movement."

Maddieson (1997a) also suggests that one of the reasons for the difference in VOT between English stops /p/ and /k/ is the distance from the pivot point of the jaw rotation. A schematized representation of the effect of jaw rotation is shown in Figure 3.1 (From Cho and Ladefoged, 1999). As illustrated in the figure, because the pivot of jaw rotation is further from the lip than from the tongue body, the movement of the lower lip will be greater than that of the tongue body for a given angular motion of the jaw (see also Vatikotis- Bateson & Ostry, 1995). As Maddieson (1997a) notes, when the articulator is the lower lip, the compressed air behind the constriction escapes at a faster rate, resulting

in a shorter time before building up an appropriate transglottal pressure for the initiation of voicing.

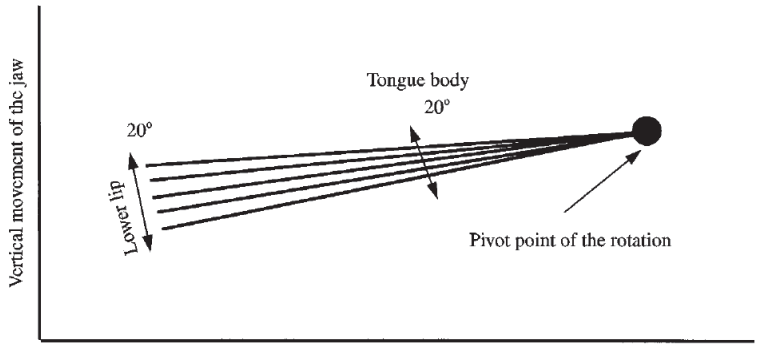


Figure 3.1. Schematic representation of the effect of jaw rotation. A 20° shift in jaw angle separated the lips apart more than the tongue back and velum by Cho and Laddefoged (1999:210).

2.2.3. Articulatory contact area

Accounting partially for the VOT variations in terms of the extent of the contact area between the articulators, Cho and Ladefoged (1999:210) explained that "as velar stops are produced with a constriction between the rounded upper body of the tongue (the dorsum) and the similarly rounded soft plate, the contact area is more extended than that in bilabial and alveolar stops." There is a similar difference in contact length between laminal and apical stops which almost always accompanies dental vs. alveolar stop contrasts (Ladefoged & Maddieson, 1996). In general, stops with a more extended articulatory contact have a longer VOT (Cho and Ladefoged, 1999).

Stevens (1999) provides an aerodynamic explanation for these differences. His main point is that the rate of change in intraoral pressure following the release depends on the rate of increase in cross-sectional area at the constriction. This is significantly different for different places of articulation, primarily due to the differences in the extent of articulatory contact. Consequently, the decrease in intraoral pressure after the closure is gradual for the velar and rapid for the bilabial. Stevens' aerodynamic data show that the volume velocity of airflow at both the constriction and the glottis increases roughly in proportion to the rate of the decrease in intraoral pressure for the first 50 ms immediately

following the release of the closure. Schematized curves of airflow and intraoral pressure at the release of voiceless stops appear in Figure 3.2. The timing of the vocal folds vibration is determined by the two inter-related aerodynamic factors shown in the figure: (1) the rate of decrease in intraoral pressure and (2) the rate of increase in volume velocity of the airflow.

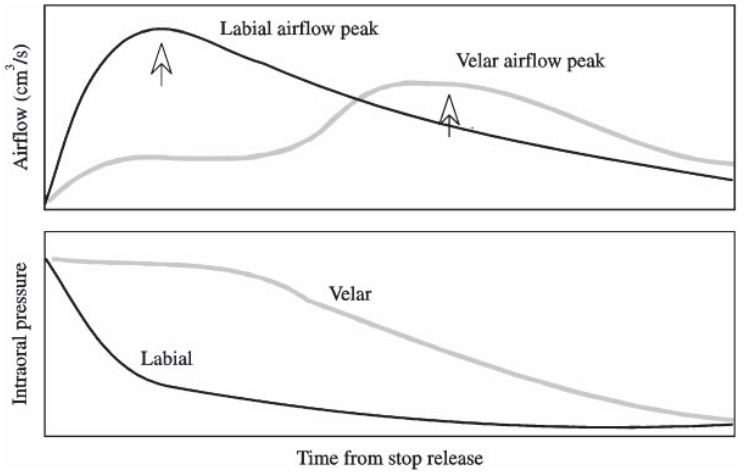


Figure 3.2. Schematized curves of airflow and intraoral pressure at the release of voiceless stops, based on data in Stevens (1999).

2.2.4. Glottal opening area

In addition to the factors described above, Stevens (1999) ascribes differences in VOT among voiceless aspirated stops to the different degrees of glottal opening area that accompany the different places of articulation. For the aspirated stops, he noted that the glottis is already open well before the release to allow for aspiration. After the release, this glottal opening must be reduced to reach approximately 0.12 cm^2 in order to initiate vocal fold vibration. The first precollisionary and the first collisionary vibration cycles are shown in Figure 3.3 (McDonnell et al., 2010). Stevens suggests that the glottal opening area after the release will decrease less rapidly for the velar than for the alveolar or for the labial stop because the intraoral pressure for the velar stop drops more slowly. On the basis of these assumptions, Stevens posits that the glottal area decreases somewhat more rapidly following the release of bilabial or alveolar stops than the velar

stops, since the decrease in intraoral pressure following the release of the bilabial or the alveolar stop is more rapid, and there is a more rapid formation of the adduction forces along with a more rapid relaxation of the stiffness. Thus, the voice onset occurs somewhat earlier for a labial or alveolar than for a velar voiceless aspirated stop (Cho and Ladefoged, 1999).

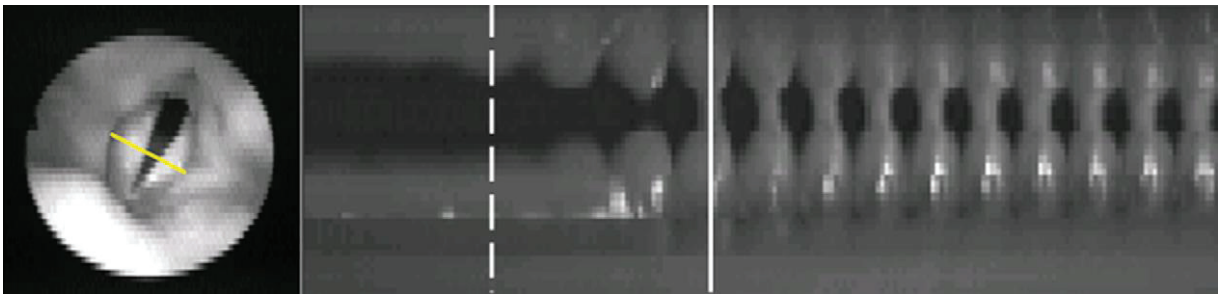


Figure 3.3. Fiberscope image and high-speed kymogram (left and right panels). The latter was taken at the line across the glottis shown in fiberscope image. The dashed and solid lines in the kymogram show the first precollisionary and the first collisionary vibration cycles (From McDonnell et al., 2010:3).

2.2.5. Temporal adjustment between stop closure duration and VOT

The stop closure duration for bilabial stops is, in general, longer than that of either alveolar or velar stops, which may be due to different degrees of air pressure in the cavity behind the constriction (Maddieson, 1997a). Cho and Ladefoged (1999) already noted that a smaller cavity behind the constriction will cause a more rapid build-up of the intraoral air pressure, reaching equity with subglottal air pressure in a relatively shorter time. Based upon this aerodynamic principle, Cho and Ladefoged (1999:212) cited Maddieson's (1997a) suggestion: "if the consonant gesture is timed in some way that directly relates to the time of the pressure peak, then broadly speaking, the further back in the oral cavity a stop closure is formed, the shorter its acoustic closure duration will be" (p. 630). This provides an inverse relationship between the closure duration and the observed VOT variation. Weismer (1980) reports that for word initial English /p/ and /k/, the interval from the onset of the stop closure to the voice onset is the same. Based upon this result and other evidence cited by Weismer, Maddieson (1997a) suggests another

possible alternative account of the place-dependent VOT: “There is an abduction-adduction cycle of the vocal cords for voiceless stops which is longer in duration than the closure and has a constant time course, anchored to the onset of closure (p.621).” In other words, the duration of the vocal fold opening is considered to be fixed, and when the closure duration is relatively longer, the following VOT becomes relatively shorter (and vice versa) (Cho and Ladefoged, 1999). Figure 3.4 is a schematic representation from Maddieson (1997a, p.622) showing this relationship. Umeda (1977) and Lisker & Abramson (1964) also discuss the same type of durational relationship between closure and aspiration.

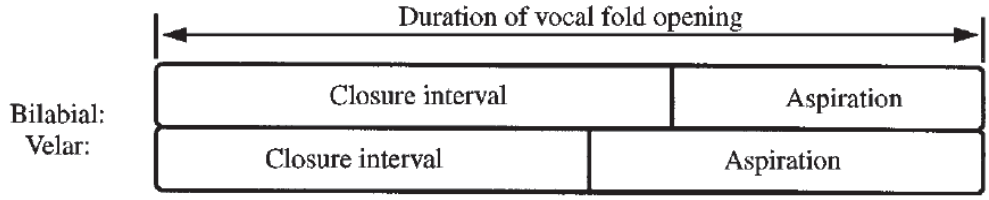


Figure 3.4. Schematic representation of place differences in aspirated stops from constant vocal fold abduction plus different closure duration. (From Maddieson, 1997*a*, p.622).

To summarize the above literature, it could be concluded that the physiological/aerodynamic characteristics account for the variations of VOT associated with a difference in the place of articulation. On the basis of this assumption Cho and Ladefoged (1999) consider the characteristics (2.2.1)-(2.2.3) to explain unaspirated or slightly aspirated stops. They noted that these characteristics are based on a general principle of aerodynamics (p.213): “objects such as the vocal folds will vibrate only when there is a sufficient pressure difference across them, and sufficient flow between them. This principle holds, however, only if the vocal folds are adducted so that they are in a suitable position to vibrate.” In the case of aspirated stops their conclusion based on Maddieson’s (1997a) result is that this does not occur for a considerable period after the release (p.213): “Place effects on the transglottal pressure occur in the first few milliseconds after release. Even for velar stops the tongue body is expected to have lowered 4-5 mm by 50 ms after the release. It is therefore unlikely that in any aspirated

stop the supraglottal pressure will be high enough to affect the voicing initiation more than 50 ms after the release when the vocal folds are sufficiently adducted".

On the other hand, Cho and Ladefoged (1999) presume the characteristics (2.2.4) for aspirated stops, and (2.2.5) for both unaspirated and aspirated stops. The characteristics in (2.2.4) explain, though indirectly, why the vibrations of the vocal folds are suppressed even after an adequate transglottal pressure is attained. Recall that the stiffness in walls of both vocal folds and vocal tract are maintained to some degree following the release, which presumably inhibits the vocal fold vibration (Stevens, 1999). The explanation in (2.2.5) also seems to account better for the variation of the aspirated stops. It depends on notions of speech timing rather than any aspect of the aerodynamic mechanism varying with different places of articulation (Cho and Ladefoged, 1999).

2.3. Unaspirated vs. aspirated stops

Languages differ in the values of VOT that they choose as the basic value for an unaspirated or an aspirated stop. Based upon the results Cho and Ladefoged (1999) pointed out by investigating 18 languages, they show the complete set of values for both aspirated and unaspirated velar stops, a total of 25 mean values in Figure 5. In their discussion about aspiration in the 18 languages data, they noted that the data do not lend themselves to a statistical clumping procedure, but it would certainly be plausible to say that there are four phonetic categories, one around 30 ms representing unaspirated stops, another around 50 ms for slightly aspirated stops, a third for aspirated stops at around 90 ms, and a fourth for the highly aspirated stops of Tlingit and Navajo.

In their discussion they couldn't find a reliable phonological reason why there might be four groups as suggested, since they reflect no differences dependent on the number of contrasts in voicing that each language has. "Banawa', for example, has only a single velar stop, with no contrast in voicing; the mean VOT for this stop is 44 ms, placing it in the second group. But both Western and Eastern Aleut also have only one velar stop; their mean values are 78 and 95 ms, making them fully aspirated stops.

Similarly, it does not matter whether a language contrasts voiceless unapirated stops with aspirated stops. Both Angami and Hupa make these contrasts. But the Angami voiceless unaspirated stops have much shorter VOTs than their Hupa counterparts and so they appear in different groups in Figure 3.5. The Angami aspirated stops are in the same group as their Hupa counterparts, but have slightly longer VOTs" (Cho and Ladefoged, 1999).

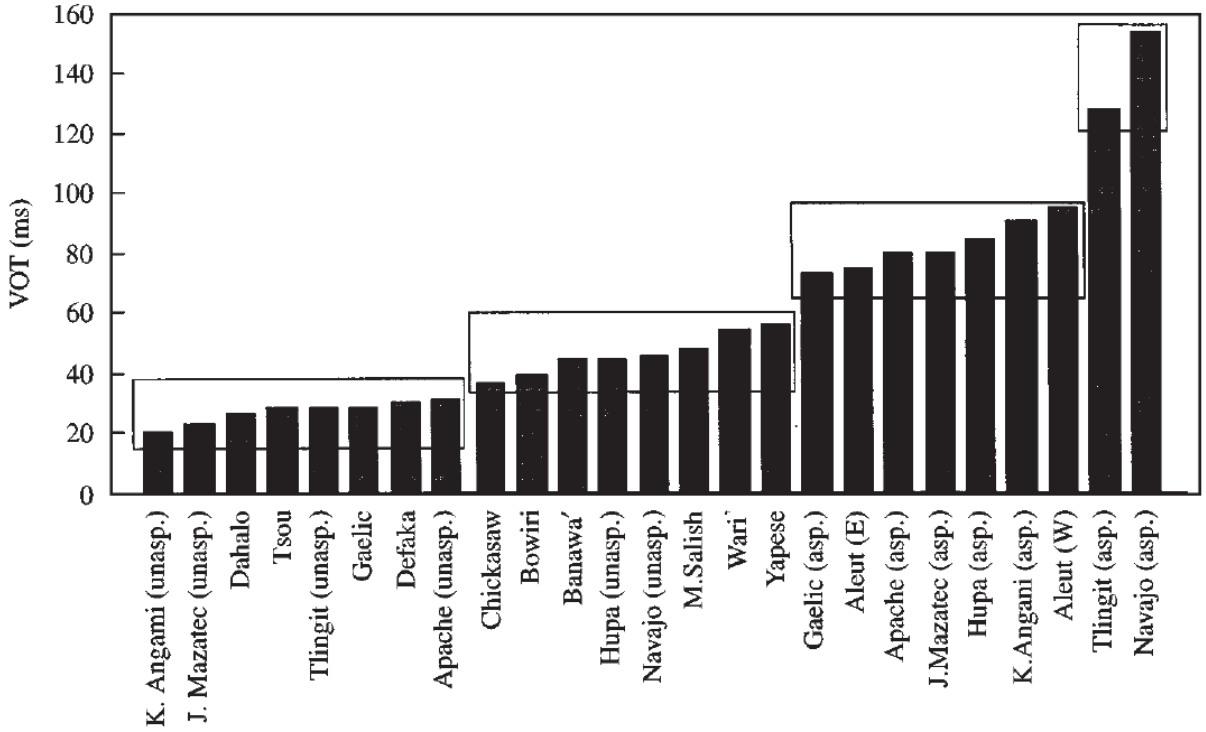


Figure 3.5. Mean VOTs (ms) for velar stops across languages. The rectangles enclose four regions, representing what might be called unaspirated stops, slightly aspirated stops, aspirated stops and highly aspirated stops (From Cho and Ladefoged, 1999:223).

2.4. Laryngeal markedness and aspiration

Phonologists generally assume that plain voiceless consonants (henceforth T) are less marked than voiceless aspirates (T^h) (Jakobson & Halle 1956, Greenberg 1966, Chomsky & Halle 1968, Maddieson 1984, Lombardi 1991, 1995, Barna 1998, Silverman 1998, Burzio 2000, Iverson & Ahn 2001, etc.), and that the unmarked two-way stop

system contrasts unaspirated voiced (D) and voiceless (T) members, as in Spanish. Systems containing a T^h series, as in English, Armenian and Turkish, are claimed to be marked in comparison (Maddieson 1984: 28; cf. Keating 1984, who proposes that all conventional two-series stop systems underlyingly oppose a voiced and a voiceless series). Following Rice (1999), Clements (2005) and Flemming (2005), there are many dimensions of markedness, which do not necessarily converge on a single target cross-linguistically in the way outlined above, and phonological patterning and feature inventories must be considered carefully, since the typical criteria for evaluating markedness, such as implication and frequency, can be unrevealing. In light of the evidence this type of appraisal presents, following Steriade (1997: 22) and Wilson (2001), Vaux and Samuels (2005) proposed that the maximally unmarked single-series stop is unspecified for laryngeal features, which is not the same as a voiceless unaspirated stop: The former may vary over voice onset time (VOT) and other phonetic parameters, whereas the latter is specified for particular laryngeal gestures. They argued moreover, based on evidence from acquisition, articulation, perception and first- and second-language phonology, that the unmarked two-way stop system opposes aspirated and unaspirated stops (T^h:T), and that the aspirated series (T^h) may be the unmarked member of this set. Markedness in three-way series depends on whether the plain voiceless series is tense (as in Armenian) or not (Polish, Russian; Trubetzkoy 1958, Pisowicz 1976). In the former case the voiceless unaspirated series is marked, as it is in Lezgian (Vaux and Samuels, 2005). They might actually except T^h to be least marked in a {D T T^h} system, because D requires muscle control and VOT synchronization and T requires VOT control, whereas T^h requires neither of these. Thus Alderete et al. (1999) seem to imply that T would be marked ‘in a three-way system, by extrapolation from their claim that in a three-tone system, the middle tone is most marked, dispersion-wise (see also Gnanadesikan 1997).

2.4.1. Aspiration as unmarked

Vaux and Samuels (2005:407) turned their attention to stops arguing that "(i) the unmarked two-way stop system actually opposes aspirated and unaspirated stops, and (ii) the aspirates may be the unmarked member of this set". This idea is consistant with the recent work of Iverson & Salmons (1995, 2003) and Avery & Idsardi (forthcoming), who suggest that a bare (i.e. unmarked) laryngeal node may be enhanced by [spread glottis], which apparently does not change the markedness relations in the system. Following Vaux and Samuels (2005), a number of acquisition facts and articulatory, perceptual and phonological considerations support the two proposals advanced here.

2.4.1.1. Acquisition

While child-language data are sometimes misrepresented or misinterpreted, when considered in their entirety and in their proper context they can provide important insights into the relative complexity and difficulty of linguistic phenomena. According to Vaux and Samuel's (2005) assumption, a less complex system will be learned faster and more accurately than a more complex system. With this in mind, it has been observed in the domain of first language acquisition that the two-way system acquired earliest by L1 learners is plain voiceless vs. voiceless aspirated (T:T^h) (Leopold 1947, Olmsted 1971, Cruttenden 1985, Goldstein 2001); children in an English speaking environment acquire the D/T:T^h contrast between 1;10 and 2;8 (Smith 1973, Macken & Barton 1980), whereas children learning Spanish do not master their D:T contrast until after the age of four (Macken & Barton 1979). Similarly, Deuchar & Clark (1996) found that a bilingual Spanish-English child acquired an adult-like voicing (i.e. D:T^h) contrast in English by 2;3, but had not yet done so for their Spanish D:T system.

Similar results, namely that the English-type system (D/T:T^h) is acquired faster and more successfully than a voiced/voiceless system (D:T), have been obtained for second-language learners in work by Fellbaum (1996) (for Spanish and English) and Khattab (2000) (for Arabic and English). This can be connected to Major & Kim's (1999)

suggestion that learners have more difficulty acquiring similar sounds than dissimilar sounds, which they base on the finding that there is no difference between novice and experienced learners in their recognition and production of dissimilar sounds, which are acquired quickly, but there is a difference in the production and perception of similar sounds.

It is also worth noting that some dialects of languages whose voiceless stops are unaspirated have changed these into voiceless aspirates, even in the apparent absence of neighbouring languages displaying such systems. Examples of this include the Basque Souletin variety of Basse-Soule, France (in at least some environments; Coyos 1994 and references therein), north-eastern Dutch dialects (Jansen 2004: 79), Cypriot Greek (Newton 1972), Cosenza Italian (Sorianello 1997), Salentino Italian (Andrea Calabrese, personal communication), Newscaster Malay (Poedjosoedarmo 1996) and perhaps Swahili (see discussion in Houlihan 1977). The fact that these languages have changed original D:T systems into D:T^h or T:T^h systems receives a straightforward explanation in the theory advanced in this thesis, in the case of the minority Kurmanji language and the dominant Persian, wherein voiceless aspirates (T^h) are less marked than plain voiceless stops (T), and aspiration contrasts (D/T:T^h) are easier to acquire and less marked than voicing contrasts (D:T).

2.4.1.2. Articulation

Turning next to the articulation of stops, based on simplistic considerations Vaux and Samuels (2005:408) expected that "voiceless aspirates (T^h) to be less marked than D and T, because fully voiced stops (D) require specific muscle control and VOT synchronisation, and short-lag stops (T) require precise regulation of VOT, whereas long-lag stops (T^h) require neither of these types of precision." Closer inspection of the facts supports this idea. Koenig (2001:1059) observes that VOT measures the relative timing between laryngeal and supralaryngeal events (voicing/aspiration and closure/release respectively), and hence "the sequence by which children attain adult-like values of VOT has been widely used as an indication of interarticulator timing control development."

The evidence suggests that the amount of interarticulator control required to implement a voiceless aspirate (T^h) is not as great as it is for a plain voiced (D) or voiceless stop (T). Goldstein (2001) observed that voiceless aspirates do not in fact require laryngeal‑oral gesture coordination. It is specifically mastery of the aspiration contrast ($T:T^h$), not the segments on their own, that requires coordination of a laryngeal gesture (glottal opening-closing) with an oral constriction gesture. In general terms, an aspiration contrast requires coordination of only this single gesture pair, whereas a voicing contrast (D:T) requires more sophisticated coordination of multiple gestures (Kewley- Port &Preston 1974, Goldstein 2001). Auzou et al. (2000:137‑138) specified that in order to produce a voicing contrast, a speaker needs to coordinate the timing of velopharyngeal closure, supraglottal articulator closure, vocal fold oscillation and supraglottal articulator release. These facts help make sense of Gandour et al.'s (1986) observation that the voiceless aspirates are acquired before the voiced series in Thai and Hindi, and the fact that Parkinson's Disease and other speech disorders involving compromised articulatory control show significant increases in the amount and range of VOT in voiceless consonants (Özsancak et al. 1997 and references therein). Ageing, which also involves degeneration of articulatory control, produces a similar increase in VOT variability (Sweeting & Bacon 1982, Morris & Brown 1994). Morton & Tatham (1980:7) observed along similar lines that the default state for CV coarticulation is to cause aspiration of voiceless consonants before vowels; a 'production instruction' is required to inhibit this universal phonetic rule and produce the closer alignment of release and voice onset required for short-lag stops in Italian, French and so on. Interestingly, they added (1980: 10) that inhibiting this universal phonetic rule is of limited utility, since the two-way contrast is easily maintainable without it, and therefore the production instruction is generally avoided in languages. There is ample experimental evidence that voiceless unaspirates (T) require active laryngeal control (Halle & Stevens 1971), which makes sense, given the difficulty involved in coordinating release of closure with onset of voicing (Vaux and Samuels, 2005).

2.4.1.3. Perception

There are also many perceptual considerations that favor an aspiration contrast over one of voicing. In this section we consider enhancement, innate sensitivity to the long-lag aspiration boundary and perceptual salience.

2.4.1.3.1. Dispersion/enhancement

It has been suggested that certain systems favor dispersion or enhancement of the perceptual contrast between their members, notably by Lindblom (1986) for vowel systems. Enhancing a two-way contrast with aspiration may result in part from this phenomenon; increasing the acoustic‑phonetic distance between voiced and voiceless phoneme categories has been claimed to accentuate their perceived contrast (Williams 1980: 201; cf. Avery 1997, Iverson & Salmons 2003). Similar notions are expressed by Keating's (1984) polarization principle, according to which (contra Keating et al. 1983 and Holt et al. 2004: 1764) languages tend to maximize differences in VOT between contrastive series of obstruents, and by Iverson & Salmons (2003) and Avery & Idsardi (forthcoming). There exist in fact many languages that oppose a fully voiced series to a voiceless aspirated series (D:T^h), such as Swedish (Ringen & Helgason 2002), some idiolects of English (Williams 1980, Singhaniyom 1999, Scobbie 2002), Swahili (Polome´ 1967) and many Western dialects of Armenian (Vaux 1998b). Since a D:T^h contrast is easier to perceive than a D:T contrast, the former would be easier to learn than the latter, and hence more common over evolutionary time. Vaux and Samuels expected to find cases where less-dispersed systems (D:T, T:T^h) evolve into more-dispersed systems. One such example is Modern Persian cited by Vaux and Samuels (2005:410); Pisowicz (1987) observed that "the emergence of aspiration [of the original plain voiceless series (T) in Persian] was probably caused by the tendency to increase the distance between the voiced and the voiceless members."

The maximization of contrast using aspiration can also be seen in rate of speech effects. Many studies have found that VOT values vary with speaking rate in normal

speech production: VOT decreases as the rate increases (cf. Diehl et al. 1980, Miller 1981, Baum & Ryan 1993). Slower speaking rates result not only in longer VOT but also in a wider range of VOT values (Miller & Volaitis 1989). Auzou et al. (2000:141) note that "this effect is particularly prominent in English for voiceless stop consonants while values for voiced stops remain relatively stable. Thus, the difference between VOTs of voiced and voiceless consonants is reduced when the speaking rate increases." Thus when speakers have access to the requisite cognitive and articulatory resources, they prefer to disperse their stop series, particularly by increasing the amount of aspiration on the voiceless series (Vaux and Samuels, 2005).

Returning to dispersion in systems where there is a contrast, though, it should come as no surprise that it is also difficult to implement a system that allows less room for dispersion. Importantly, in systems containing three or more series the plain voiceless series (T) is more constrained than the others in terms of VOT; the voice-lead series (D) can extend quite far in the lead direction and the long-lag series (T^h) can extend in the lag direction, but if the short-lag series (T) extends in either direction it will overlap with one of the other series. Vaux and Samuels (2005:411) schematize this dynamic in Figure 3.6.

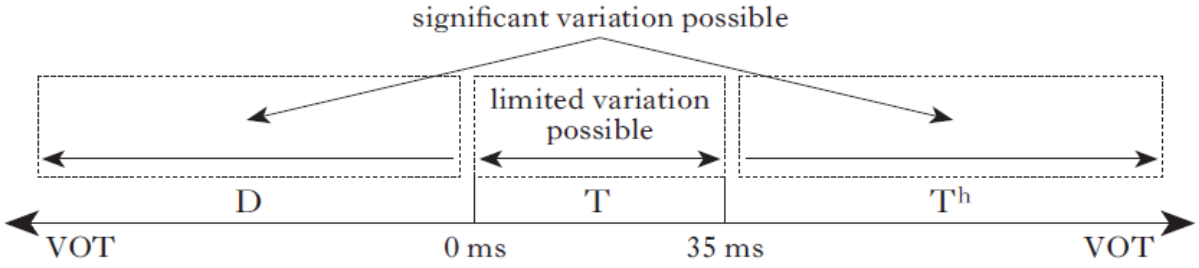


Figure 3.6. T constrained along the VOT axis relative to D and T^h by Vaux and Samuels (2005:411)

2.4.1.3.2. Perceptual salience

Vaux and Samuels' (2005) next perceptual argument begins with the oft-cited fact that all linguistic groups have their major discrimination peak at the English (i.e. long-lag) VOT boundary for both children and adults. Beach et al. (2001) found for instance that monolingual speakers of Australian English and bilinguals who also spoke Greek

were able to successfully distinguish Thai [b]:[p^h] and (crucially) [p]:[p^h], but not [b]:[p]. Eimas et al. (1971) obtained similar results for one- and four month-old infants, who in their study discriminated [pa] and [p^ha] categorically, but not [ba] vs. [pa]. Similarly, Lasky et al. (1975) found that six-month-olds Guatemalan could discriminate voicing distinctions, but their perceptual category boundaries were closer to those of English learning infants (i.e. at the long-lag VOT boundary, ca. 35 ms) than to those of their Spanish-speaking parents (at the short-lag boundary). Adult speakers of relevant languages, such as Spanish and Kikuyu, have a smaller perceptual peak at the Spanish border in addition to a main peak at the long-lag boundary (Lasky et al. 1975, Streeter 1976, Eilers 1980:27‑28, Willaims 1980:208), but all of the above findings clearly agree on the English (long-lag) boundary being the most perceptually salient for both L1 and L2 learners (Vaux and Samuels, 2005).

This asymmetry in acquisition time has been connected by some to the well-known fact that the long-lag VOT boundary also exists in chinchillas (Kuhl & Miller 1975, 1978), rhesus macaques (Waters & Wilson 1976, Kuhl & Padden 1982), budgerigars (Dooling et al. 1989) and Japanese quail (Kluender et al. 1987), suggesting that humans (and perhaps all animals) are innately predisposed to categorize acoustic stimuli relative to this benchmark and thus receive a head start in acquiring an aspiration system (or, put differently, are more likely to acquire it successfully).

Regardless of whether or not the animal findings are relevant to the human case, the long-lag boundary appears to be an especially salient boundary in an acoustic sense (Stevens & Klatt 1974, Eilers & Minifie 1975, Williams 1980: 210‑211, Aslin et al. 1983, Deuchar & Clark 1996, Vihman 1996: 74). Many phonetic features that have been found to cue a voicing/aspiration contrast are available at the long-lag vs. short-lag boundary but not at the voice-lead vs. short-lag boundary (Vaux and Samuels, 2005:414), including:

(i) formant cutback (presence/absence of transition information for the first formant) (Liberman et al. 1958, Lisker 1975, Tsui 1996);

(ii) spectral characteristics of the release burst, including aspiration noise between release and the onset of periodic vibration (Winitz et al. 1975, Williams 1977, Hutters 1985: 17);

(iii) differences in the degree and temporal extent of formant transitions (Cooper et al. 1952, Stevens & Klatt 1974, Summerfield & Haggard 1974);

(iv) differences in F0 change following release (Haggard et al. 1970, Fujimura 1971).

By contrast, voicing-lead cues are characterized by lower energy and are less perceptually salient (Williams 1980: 210).

Following Vaux and Samuels (2005), what I conclude from all of this evidence is that there appears to be an innate sensitivity to the long-lag VOT boundary, which is supported by a host of perceptual cues that are not shared by the short-lag VOT boundary. These two perceptual considerations reinforce the unmarkedness and/or greater learnability of the aspiration opposition. Two findings from studies of animal auditory perception may support this argument. Holt et al. (2004:1763) observed that "behavioral experiments with infants, adults, and nonhuman animals converge with neurophysiological findings to suggest that there is a discontinuity in auditory processing of stimulus components differing in onset time by about 20 ms", and suggest that perceptual boundaries close to this temporal value are easier to learn. The 'double on' account of voicing suggests that voicing categories are based on low-level properties of the auditory system.

In sum, both the neural evidence adduced by Phillips and the acoustic and perceptual evidence presented here support the position that long-lag stops (T^h) are more perceptually salient and easy to identify than short-lag stops (T) are.

2.4.1.4. Phonological behaviour

The acquisition and phonetic facts considered thus far support the aspiration theory, but, as Rice (1999) has stated, the most important type of evidence in developing an analysis of markedness should come from phonological patterning.

2.4.1.4.1. Previous proposals for voiceless aspirates being unmarked

The idea that aspiration can be phonologically unmarked is not entirely new. Concrete proposals of this sort have been made by Trubetzkoy (1958: 263) for Lezgian, Pisowicz (1976: 88‑89) for Eastern Armenian, Howe (2000:31‑32) for Oowekyala, Bach (1991) for Haisla, and Avery (1997) and Avery & Idsardi (forthcoming) for English. To take one concrete example, Oowekyala, like Lezgian and Haisla, has a D:T^h:$T^?$ system; voiced stops and affricates occur only before tautosyllabic sonorants, and voiceless aspirated stops are unrestricted in their distribution (Howe 2000: 32). Based on the elsewhere status of the voiceless aspirates and their appearance in neutralisation contexts, Howe states that 'there is compelling evidence that the "aspirated" stops of Oowekyala are phonologically unmarked, while the phonetically "plain" stops are phonologically voiced… under this view of laryngeal contrasts, it is claimed that aspiration is no more than a phonetic property of stops and affricates with unmarked laryngeal specification in Oowekyala. Conversely, it is claimed that the lenis pronunciation of unaspirated stops …reflects the fact that these segments are phonologically marked ([voice] or [constricted])' (Howe 2000: 31‑32). In addition to Oowekyala, several other indigenous languages of the Pacific Northwest employ aspiration as the elsewhere case for stops.

2.4.1.4.2. Second-language facts

One finds the same phenomenon of neutralization to voiceless aspirates in word-final position in second-language production. Eckman (1981), for example, makes the intriguing observation that languages without final and/or coda consonants devoice when they borrow such consonants (cf. also Altenberg & Vago 1983 (Hungarian‑English), Flege et al. 1987, Weinberger 1987, Edge 1991, Yava 1994, Broselow et al. 1998 (Chinese‑English)); Vaux and Samuels (2005) added to this that at least in the case of several Japanese, stops in this position are not only voiceless but also aspirated. The papers that notice final devoicing typically do not indicate whether these devoiced

consonants are also aspirated (cf. e.g. Broselow et al. 1998), but aspiration has in fact been noted in the following cases:

(1) L2 neutralisation to voiceless aspirates in word-final position

a. Mandarin speakers' acquisition of English (Heyer 1986) and French (Steele 2002).

b. Korean speakers' acquisition of English (Pyun 1999).

c. Icelandic speakers' acquisition of English (Mulford & Hecht 1980).

d. Italian speakers' acquisition of English (Prator & Robinett 1972: 89).

The significance of the cases in (1) involving English acquisition is clouded by the aforementioned fact that English itself has optional final aspiration; the aspiration that shows up in learners' speech may therefore result from successful acquisition of the target rule rather than an inter-language rule of aspirating neutralization (Vaux and Samuels, 2005).

2.4.1.5. Language change

Evidence for change of plain voiceless stops in favor of voiceless aspirates can also be found in the historical record. Cypriot Greek, for instance, develops aspiration of original voiceless stops in absolute initial position, word-initially when preceding word ending in a vowel, and word-medially after a vowel (Houlihan 1977: 217).17 Wanano, an Eastern Tukanoan language of Brazil, assigns aspiration to original plain voiceless stops at the beginning of initial syllables (and a few other environments; Waltz 2002). Similarly, both Proto-Armenian and Proto-Germanic develop aspiration in the original Indo-European *T series. Many Armenian dialects have gone one step further, aspirating the Proto-Armenian plain voiceless series (descended from Indo-European plain voiced stops). Perhaps significantly, none of the 120 modern dialects surveyed in Jahukyan (1972) has deaspirated the Proto-Armenian voiceless aspirate series. Finally, in Southern Swahili the original voiceless plain and aspirated series merge as aspirated (Wald 1987: 997); the same happened in Standard Western Armenian and many other Western dialects (Vaux 1998b). These historical shifts from an original unaspirated series to an aspirated

series (often as the result of a neutralisation process) are consistent with the hypothesis advanced in this thesis; expecting Kurmanji aspirated stops are unmarked relative to their unaspirated counterparts and unaspirated initial voiceless stops have undergone phonetic change through unmarked aspirated counterparts, convergent with Persian.

3. Kurmanji vs. Persian Voice Onset Time

The notion of language dominance refers to two kinds of phenomena. One is the sociolinguistic situation in which a language is socially or politically dominant, and the other pertains to an individual's differential use of two or more languages. A bilingual or monolingual speaker will often use one language more frequently than another, so that language can be said to be dominant (Grosjean, 2008). Change may occur as a result of external influence from a dominant language in the community or language-internal dynamics having nothing to do with the dominant language. When change is externally motivated, the obsolescing language may come to approximate features of the dominant language; conversely, external influence may cause salient features of the obsolescing language not found in the dominant language to be enhanced, thus further differentiating the obsolescing language from the dominant language. In short, externally motivated change may result in either convergence with or divergence from the dominant language. Whether or not the change is divergent or convergent, then, depends upon the nature of the language involved.

Khorasani Kurmanji is now only spoken by older generations. Persian as the dominant language is the main everyday language of young people and it is the language being acquired by the Kurmanji children. Kurmanji has contrastive aspirated/unaspirated initial stops and affricate consonants (Haig and Matras, 2002), rarely found in other Iranian Languages, especially Persian. There are 12 voiceless consonants in Kurmanji, and 8 of them include 3 stops and one affricate paired by the aspirated/unaspirated distinction. The four pairs are: [p],[p^h] , [t],[t^h] , [k],[k^h] , [tʃ],[$tʃ^h$].

Comparing the Kurmanji language and the dominant Persian investigated in this study which contrast [+voice] and [-voice] in initial position, I follow Bijankhan and

Nourbakhsh (2009) who proposed that in Persian the two voicing categories are differentiated in production by the presence or absence of aspiration for most of the place of articulation in initial position. In this way the voicing contrast, [+voice] and [-voice], in stop consonants in initial position can be realized as {voiceless unaspirated} and {voiceless aspirated} respectively. Compared to Persian, the phonological features [+voice] in Kurmanji is realized as {voiced}, similarly [-voiced] is considered as {voiceless unaspirated} and {voiceless aspirated}. Figure 3.7 shows the spectrogram of the two aspirated and unaspirated initial voiceless stops [t] and [t^h].

Considering the aspirated and unaspirated stops in the phonology of Kurmanji, the voiceless stops [p^h, t^h, k^h] and the voiceless affricate [$tʃ^h$] are aspirated, as in English 'pie,' 'tie,' 'key,' and 'chew' [p, t, k] and [tʃ] are unaspirated, as in English 'spy,' 'sty,' and 'ski,' and 'eschew,' and are accompanied by slight pharyngealization. They are not indicated in the writing system, and they are not universally observed by all speakers, but where they occur they contrast on the phonemic level.

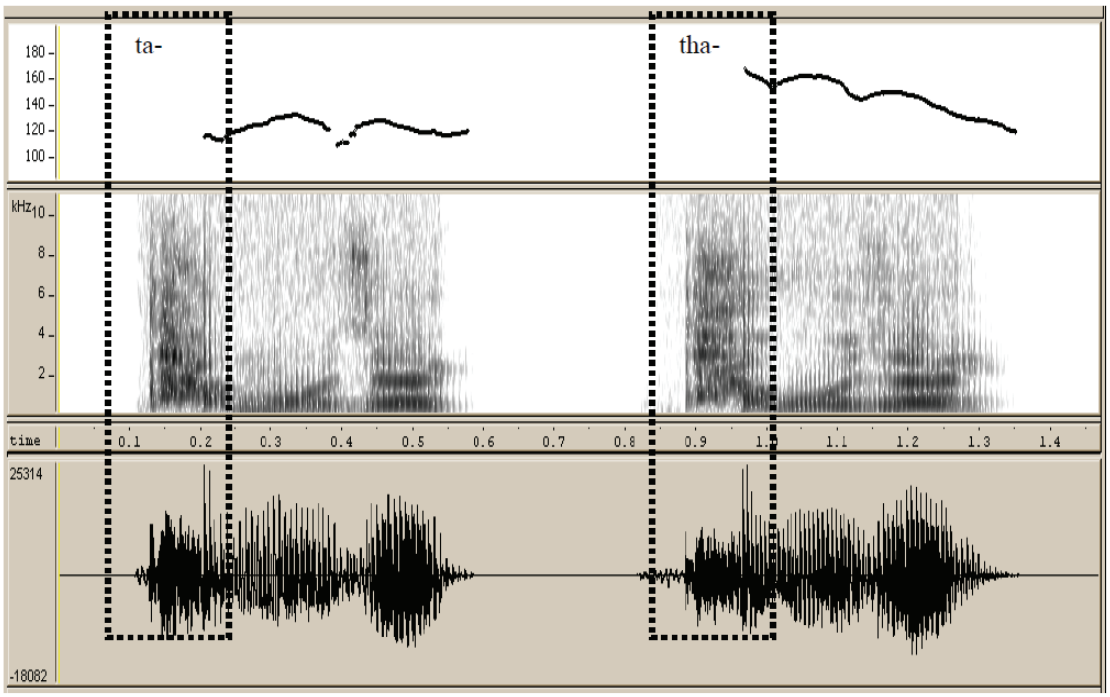


Figure 3.7. Wide-band spectrograms showing the two conditions of VOT: Acoustic displays for /ta-/ *vs.* /t^ha-/.

3.1. Aims of the study

The present study mainly investigated VOT as an acoustic correlate of voicing in Kurmanji and the dominant Persian. Persian is a language with a two-way [voice] contrast (Samareh 1992), whereas Kurmanji is a language with a three-way [voice] contrast. Determining the phonetic implementation of this phonological contrast in these two languages, i.e. the feature of the categorical phonetic representation, is one of the aims of this study. We also investigated whether this phonetic implementation is consistent or if Kurmanji shows changes regarding influences from the dominant Persian. VOT values are known to vary systematically according to place of articulation. The general finding is that VOT values increase as the place of articulation moves from anterior to posterior position in the vocal tract (Peterson & Lehiste 1960, Klatt 1975, Zue 1976). However, for each place of articulation there are language specific differences (Cho & Ladefoged 1999). In this study, we aimed to investigate place of articulation as an effective factor influencing VOT values.

There is strong evidence to suggest that VOT can vary with age differences across the generations (Nagy 2011; Flege 1991, 2001) and contact-induced change (Labov 2011; Nagy 2011). Among the goals of this study was to investigate the influence of these factors on VOT in Kurmanji. This may well be one of the first studies of VOT of such scope in Kurmanji.

3.2. The phonology of Kurmanji stops

Contrastive phonology is the process of comparing and contrasting the phonological systems of languages to formulate their similarities and differences (Yarmohammadi 2002). A contrastive analysis project involves two steps: describing each of the languages (within the same model) and juxtaposition for comparison. Kohler (1984) admits that the contrastive approach works quite well where the concern is to put contrastive studies and their practical applications in language teaching on a better foundation. Despite the many criticisms geared at contrastive analysis the two basic

tenets of it have survived: L1 is a major factor in L2 learning and important insights can be gained from the comparison and contrast of two languages (Ringbom 1994).

The expansion of Contrastive Analysis led to the developments of error analysis, contrastive discourse, and contrastive pragmatics. The extension of Contrastive Analysis continued in the 1980s: The interests in parameter setting in Chomskyan linguistics, contrastive pragmatics based on the statements of universal principles to elucidate different realizations (Thomas 1983), contrastive rhetoric hypothesis which proposes that 'different speech communities have different ways of organizing ideas in writing' (Chen 1997) are some other examples of the expansion of Contrastive Analysis. Many language teachers still find Contrastive Analysis useful, especially in phonology. Transfer is present in phonology more than any other area and it is because of this fact that one can guess the first language of a speaker through his/her accent while speaking a second language. A significant body of experimental and naturalistic studies has demonstrated that bilingual speakers of Iranian language Persian pairings are capable of creating separate phonetic categories for the production of voiceless stops, measured as voice onset time, across their languages. However, bilinguals equally tend to show altered, either converged or exaggerated, VOT values in one or both of their languages relative to those of monolingual speakers. The focus of the present study is to examine the effect of the language dominance in two generations of a moribund language by realizing the differences of the voice onset time as a phonetic correlate of voicing distinction in two generations of Kurmanji speakers and compare it with Persian as a dominant language. The target is the initial voiceless aspirated/unaspirated stops. Our expectations are to observe the gradual change from initial voiceless unaspirated to voiceless aspirated in Kurmanji speakers Generation2, externally motivated, convergent with Persian.

Kurmanji has thirty consonantal and eight vocalic phonemes (University of Victoria Phonetic Database; UVPD 1999). Ten plosives and two affricates are contrastive, which altogether form the twelve stops of Kurmanji.

The traditional characteristics of stops could be summarized as follows:

/b , p , p^h/: bilabial plosives /d , t , t^h/: dental-alveolar plosives

/g , k , k^h/: velar plosives /G/: uvular plosive

/ʔ/: glottal plosive /dʒ , tʃ , $tʃ^h$/: alveo-platal affricates

The stops investigated in this study are /p, p^h, t, t^h, k, k^h, tʃ, $tʃ^h$/ in initial position. The four phonemes of /p, t, k, tʃ/ are unaspirated whereas, the four phonemes /p^h, t^h, k^h, $tʃ^h$/ are aspirated stops.

Three aspects of Kurdish phonology are rather unevenly treated in the literatures: emphatic consonants, gutturals, and aspirated consonants. Regrettably the emphatics (ejective or implosive consonants, akin to Arabic /ث/ ،/ض/ ،/ص/ ،/ذ/) are largely undocumented in the existing literature. As for the gutturals (pharyngeal consonants), many Kurds refuse to accept the fact that these "Arabic sounds" exist in their language, and consequently neglect to include them in their writing system. These guttural sounds (Akin to Arabic /غ/ ،/ق/ ،/خ/ ،/ح/) are an integral part of the Kurdish language of today, and should be recognized as such, as they already have been by Soviet scholars, as well as by Margaret Kahn in her doctoral dissertation.

Finally, the aspirated/unaspirated consonantal pairs /p, p^h, t, t^h, k, k^h, tʃ, $tʃ^h$/ are regularly distinguished by the Soviet scholars and in a few works by modern linguists. The Soviet scholars, many of whom also know Armenian, have no doubt been influenced by the existence of this feature in Armenian as well. This distinction is generally ignored in modern Kurdish publications, with the notable exception of Musa Anter's Kurdish-Turkish dictionary - in which only the pair aspirated k/unaspirated k is distinguished - and in Baran Rizgar's Kurdish-English/English-Kurdish dictionary. In the Arabic script, no way has been devised to distinguish these consonantal pairs. Nevertheless, for Kurmanji speakers in Iraqi Kurdistan - who are most comfortable using the Arabic script - the distinction is real, and has a phonemic importance. For example, they distinguish kitik = 'dried figs' (with non-aspirated k) from k^hitik = 'cat' (with aspirated k).

It should be noted that the earliest collectors of Kurdish texts, among them Oskar Mann (1906-07) , Albert Socin (1895) and M. Auguste Jaba (1856), while failing to distinguish these various consonantal niceties, went overboard in trying to record the most infinitesimal gradation of vowel length. The same can be said for contemporary texts in Arabic, Neo-Aramaic, Turkish, and the like. Bakaev (1957) who was a native speaker of the Kurmanji language, distinguished both aspirated/unaspirated consonant pairs /p, p^h, t, t^h, k, k^h, tʃ, $tʃ^h$/ in his Kurdish-Russian dictionary, Ch.Kh. Kurdsko-Russkii Slovar' okolo 14000 slov s prilozheniem grammaticheskogo ocherka kurdskogo iazyka (Moskva: Gosudarstvennoe Izdatel'stvo Inostrannykh i Natsional'nykh Slovarei, 1957).

Another Kurdish-Russian phraseological dictionary Statei (Erevan: Izdatel'stvo AN Armianskoi SSR 1979), in Cyrillic script, preserves the aspirated/unaspirated dichotomy. A distinction is made between the paired sounds /p, p^h, t, t^h, k, k^h, tʃ, $tʃ^h$/ (unaspirated/aspirated), which is of great value to linguists and phoneticians. However, Rizgar's choice of designation is unfortunate. Had he availed himself more of the works of the Soviet Kurdologists (particularly Bakaev), he would have seen that by marking the non-aspirated member of each pair, he has deviated from the established practice of marking the aspirated member. For example, 'to do' is generally written kirin (with non-aspirated k which is unmarked), and 'to buy' is k^hirîn (with aspirated k which is marked with an apostrophe [k’]). Rizgar has reversed this distinction, writing the former as k’irin and the latter as k’irîn. For the non-native speaker, much less for the handful of literate Kurmanji speakers, distinguishing between these paired consonants is difficult enough. In switching the system around, Rizgar has added another confusing dimension which is both unnecessary and avoidable. He is, nonetheless, to be praised for maintaining this distinction where others have not.

3.3. The phonology of Persian stops

Persian belongs to the Indo-Iranian branch of the Indo-European language family. Persian is the official language of Iran, the variety spoken by educated people in Tehran (capital of Iran) and in the media. The style level which is the subject of this study is formal quotative according to Hodge (1957: 364–365).

Persian has twenty-three consonantal and six vocalic phonemes (University of Victoria Phonetic Database; UVPD 1999). Some scholars add one diphthong phoneme to the vocalic set (Mahootian 1997: 286). There exists, however, some evidence against the inclusion of diphthongs in the vocalic phonemes of Persian. However, this discussion would be beyond the scope of this study. Eight plosives and two affricates are contrastive, which altogether form the ten stops of SCP. The traditional characteristics of stops could be summarized as follows:

/p, b/ bilabial plosives /t, d/ lamino-dentalveolar plosives

/k, g/ dorsal plosives /ɢ/ dorso-uvular plosive

/ʔ/ glottal plosive /tʃ, dʒ/ dorso-postalveolar affricates

The stops under investigation in this study are /p, t, k, tʃ /, i.e. the set of oral voiceless stops. Bijankhan and Nourbakhsh (2009) follow the assumption of most scholars who consider /t/ and /d/ to be dental (Windfur 1979, Pisowicz 1985, Lazard 1992, Samareh 1992). There are also different ideas about the exact place of articulation of the dorsals /k, g/. Some scholars consider them as velars or prevelars (Mahootian 1997, Windfuhr 1979, UVPD 1999). Pisowicz (1985: 17, 32–33) considers palatals and velars as the allophones of /k/ and /g/. He proposes that palatal articulation (and not velar articulation) may be regarded as the chief representation of the phonemes /k/ and /g/. Bijankhan and Nourbakhsh (2009) believe that palatals should be considered as phonemes and velars as their allophones, since palatals and velars are in complementary distribution such that velars occur only in the syllable onset position when the nucleus vowel is [+back] while palatals occur in all other positions. But it should be noted that even in that case they would not have the same degree of backing as English velars.

Previous studies have been carried out on voicing contrast in Persian stops. Qarib (1965 as cited in Windfuhr 1979: 141) investigated the features of voicing on the basis of phonetic experiments; she found that besides voice the other pertinent feature is aspiration. Experiments of Zavj'alova (1961, as cited in Windfuhr 1979: 142) showed that the voiceless stops are generally aspirated whereas the voiced stops are never aspirated but may be (partially) devoiced or (partially) voiced in specific environments. Lazard (1972) suggested that aspiration is the essential distinctive feature of the above contrast and voice distinction is secondary. He consequently identified the major distinction as fortis vs. lenis. Pisowicz (1985: 36) and Windfuhr (1979: 129) also viewed the opposition as an opposition of tenseness. Mahootian (1997: 287) believes that the set of voiceless stops are aspirated in syllable initial position and unaspirated at the end of a syllable. UVPD (1999) considered voiceless stops as aspirated in all positions. Heselwood & Mahmoodzadeh (2007), in an EGG experiment, investigated vowel onset characteristics including VOT, measures of pitch (Fx), closed quotient (Qx) and spectral tilt (ST) as a function of voice and manner contrast in Persian coronal stops. They showed that VOT distinguishes between voiced and voiceless coronal stops. Regarding the Fx measurements, they concluded that it distinguishes voiced from voiceless coronal plosives but not voiced from voiceless affricates. They report that the spectral tilt distinguishes voiced from voiceless stops. Their results also showed that the minimum, mean and maximum Qx differences between /t/ and /d/ are significant, but only the minimum Qx difference reaches significance for distinguishing /tʃ/ and /dʒ/ (Bijankhan and Nourbakhsh, 2009).

4. Methodology

4.1. Participants

This study is based on archival recordings of 5 male speakers from Generation1 Kurmanji Speakers. Managing the study, 5 male speakers from Generation2 Kurmanji Speakers were also investigated in the study by recording the target stimuli. Both

Generations lived in northeast of Iran for most of their lives. Participants were bilingual of Persian and Kurmanji. The mean age ±SD of the participants was 43.2 ±4.6 ranging from 30 to 55 years old. None of them reported any history of speech disorder. The VOT values of each sample were segmented in Praat (Boersema and Weenik, 2008). VOT measurements were made from the signal by measuring the time between the release burst and the onset of voicing marked by the first visible sign of periodic acoustic activity. Table 3 below lists examples of aspiration forms in initial position in Kurmanji.

4.2. Materials

A corpus was constructed from Archival[1] and original recordings of Kurmanji

[1] The "Linguistic Atlas of Iran" started in June 1974, in the form of a joint endeavor by the "Iranian Academy of Language" and "National Geographic Organization". Titled "Farhangsaz" (a blend of the names of the abovementioned organizations, meaning roughly, "culture-propagator"), the project followed as roughly simultaneous data-gathering (on the field) and transcription (at the headquarters). The social developments of the year 1979 led Farhangsaz into a relatively long period of suspension, during which the documented data were handed over among several organizations to wait for future investigations. The last among these organizations was then Iranian Cultural Heritage Organization (newly titled 'Iranian Cultural Heritage, Handicrafts, and Tourism Organization'). As of this date up to the revival of the project in the year 2001 and its declaration as a national project, there were only classification of the data and some minor research which followed. The original project followed the following goals: 1) Familiarization with the linguistic varieties of Iran, and publishing the results on display maps, supporting them with related numerical data and, 2) Preparation of a Linguistic Atlas of Iran. To materialize the mentioned goals, a "Department of Dialectological Studies" was added to the organizational structure of the academy. The department enjoyed the authorization to establish the criteria required and prepare the related guidelines. The Questionnaire of the department, as well as the number of the older criteria, are still respected in the new phases of the project. Three working groups were then defined for the project: a Field Team to do the documentation, a Transcription Team to prepare the standard record of the gathered data in writing, and Control Team empowered to supervise the two other teams. No map-making teams were introduced, since, by then, the data gathering phase had not been completed. Around 16,000 interviews of those days constitute a major part of the repository of the linguistic data kept at the Dialectology Research Department (DRD) to the Languages and Dialects Research Center, ICHHTO, to be used, primarily, in the LAI National Project. In 2002 the project was revived in ICHHTO; this time the DRD was authorized for the responsibility. The new phase guided the efforts on the parts of DRD in three not fully compatible directions: 1) Preservation of the old data (due to the ever-changing nature of language, also as a result of the social developments having happened in Iran during the mentioned period, new data-gathering campaigns could not be conducted on the documented regions; on the other hand, the data nevertheless, belonged to a different generation). 2) Documentation of the regions not covered by Farhangsaz of the mid 1970's. 3) Benefiting from the new achievements in science and technology. Dr. Yadollah Parmoun who is a linguist in Iran was selected to make the necessary and/or applicable adjustments to make the old data usable in the new phase. This was done and the older project was assigned the status of an initial step to be amended in future developments. Meanwhile, the old data available on magnetic tapes were digitized. As for the research phase, a first step was the preparation of an updated procedure for transcription to be utilized by teams of trained competent linguists. (I was one of the trained linguists who worked for this project). The procedure considered the following: 1) data registration in the form of narrow transcriptions, 2) utilization of the most recent version of the International Phonetic Alphabet (IPA) for narrow transcriptions, 3) determination of a limit for narrow transcriptions expected in conditions of listening to recorded data with headphones. Finally, the 3-decade delay on the project paved the way for utilization of computer technology in the project. The drastic change, from this point of view, was a redefinition of a linguistic atlas as dynamic software of infinite outcome working in accordance with the operator's preferences.

speakers to compare word forms across two generations. The Generation2 word lists were recorded based upon the archived recordings of Generation1 word lists to manage the word tests. Finally, 40 Kurmanji words in which the onset covers the full set of Kurmanji oral voiceless aspirated and unaspirated stops /p, t, k, tʃ/ were produced by the 10 speakers representing the two generations of Kurmanji speakers. Nonsense words were not selected as material for the study, because we have observed that participants usually pronounce them in an unnatural and conservative manner. Persian data were selected based on data in Bijankhan and Nourbakhsh (2009). They selected the initial position items contained 54 monosyllabic words of the form C1V1C2, such that C1 covers the full set of Persian oral stops /p, b, t, d, tʃ, dʒ, k, g, ɢ/. In this thesis the voiceless initial stops analyzed in Persian were compared with the counterparts in Kurmanji. Monosyllabic words were all stressed. Four factors, namely voicing, place of articulation of each stop, the degree of variation based upon the generation differences and the influence of language dominance on Kurmanji were examined in initial position. Table 3 lists some examples of aspiration forms in initial position in Kurmanji.

Table 3.3. Comparison of initial stop aspiration forms in Kurmanji

	p	t	k	tʃ
Unaspirated	palis (Carpet)	tav (Sun)	kal (Old man)	tʃav (Eyes)
Aspirated	p^hir (Old)	t^hin (Thirst)	k^har (Work)	$tʃ^h$ar (Four)

4.3. Recordings and measurements

The old data from the first generation were gathered in the field with the magnetic recordings; and to make the old data usable in the new phase of the Linguistic Atlas of Iran, the old data available on magnetic tapes were digitized. The Kurmanji data of the

The project has been planned to be followed into two sections: the headquarters, with the collaboration of the private section, and provincial. As for the first section, The Pishin Pazhuh Institute has undertaken all of the executive affairs under the chairmanship of Mohammad Reza Miri, the executive director to LAI. The project remained active to around June 1978, when it was suspended again due to the budget limitations. The Archival data for the first generation analyzed in this thesis were taken by the availability of the old data in Pishin Pazhuh Institute, the executive director to LAI.

Generation1 were available from the mentioned archive. The recordings of 5 male speakers from the old data were considered to study. Managing the study, 5 male speakers from generation2 were considered to study by recording the target stimuli. The recordings of the Generation1 were made in the field, whereas recordings of Generation2 were made in quiet surroundings. Most often in speakers' homes, using a Zoom H4 recorder with built-in variable XY stereo microphones recording direct to '.wav' format (44.1 KHz/32 bit). The Persian data were made in a quiet room in the phonetics laboratory of the University of Tehran, using a high quality Shure microphone and Kay Computerized Lab (CSL) model 4400 (Bijankhan and Nourbakhsh 2009).

Recording the data for Generation2, and to manage the gathering data exactly the same as Generation1's recordings, the items were presented out of context and the participants were asked to repeat twice the Kurmanji corresponding of the Persian forms, with a pause and in a natural way, without any marked intonation.

Subsequently, the VOT of each speech sample was measured using Praat (Boersma & Weenik 2008). VOT measurements were made from the signal by measuring the time between the release burst and the onset of voicing marked by the first visible sign of periodic acoustic activity. Following Keating (1980: 36–37) for positive VOT, voice onset began with the zero-crossing before the first negative peak of pulsation. I examined spectrograms in some cases only for the confirmation of my measurement landmarks. Tokens that did not contain the proper landmarks or ones which were spirantized or sonorized were omitted from the analysis.

The reliability of acoustic measurements was assessed by within-experimenter reliability tests. 10% of the data were chosen at random and reanalyzed by the investigator at least 12 months after VOT measurement had begun. A total of 195 tokens were selected on the basis of stratified random sampling and were re-measured and compared to the original set of VOT measurements. Examination of the Pearson product correlation for similarity indicated that reliability was high. The correlation between the original VOT measures and the follow-up measures was r =.995.

4.4. Statistical analysis

Advanced statistical methods were used in order to consider the main effects of all factors as well as factor-by-factor interactions. The General Linear Model (GLM) univariate procedure, which provides analysis of variance for one dependent variable by one or more factors or variables, was considered to be an appropriate model in this study. A two-way ANOVA was utilized to assess differences of VOT values between voicing category (voiceless aspirated and voiceless unaspirated) and position (initial) factors. Two separate two-way ANOVAs were utilized for the analysis of place of articulation voiceless aspirated and unaspirated items. Separate analysis was conducted for each voicing category because of the inherent differences between voiceless aspirated and unaspirated stops. A univariate ANOVA was used to examine the effect of dominant Persian on two generations in Kurmanji and its interactions with voicing categories. An alpha level of .05 was set as the level of significance. The relative effect size of each factor and factor interactions were also calculated. SPSS 20.0 statistical software was used for all of the descriptive and analytic statistics.

5. Results and discussion

5.1. Voicing contrast distinction

The VOT values in ms for the voiceless stop consonants in initial positions are displayed in Table 4. Mean, standard deviation (SD) and number (N) of tokens are shown for each sound. Following standard practice, the aspirated and unaspirated values are presented separately for voiceless stops. Each consonant represented the different values for VOT when produced by different Generations of Kurmanji or by Persian speakers. As the results indicated in Table 4, regardless of the place of articulation, the VOT values of aspirated consonants were higher in Persian (89.24 ms) than their cognates in Generation1 (50.336 ms) and in Generation2 (74.749 ms) of Kurmanji. The VOT values of unaspirated and aspirated voiceless consonants produced by Kurmanji speakers in

Generation1 and 2 did show the longer VOT in Generation2 (59.34 ms and 74.74 ms respectively).

Table 3.4. Mean and Standard Deviation of VOT values (ms) for aspirated and unaspirated initial stops according to Generation (N = Number of test words)

VOT values (ms) for initial voiceless stops: kurmanji Generation 1&2 vs. Persian					
	Aspiration	Generation	Mean	SD	N
p	unaspirated	Generation1	22.914	4.262	25
		Generation2	43.437	3.918	25
		Total	33.175	11.129	50
	aspirated	Persian	67.541	10.706	25
		Generation1	39.559	3.563	25
		Generation2	59.859	4.255	25
		Total	55.653	13.725	75
t	unaspirated	Generation1	24.492	3.481	25
		Generation2	52.971	4.261	25
		Total	38.731	14.889	50
	aspirated	Persian	77.292	11.685	25
		Generation1	39.038	6.046	25
		Generation2	63.399	6.142	25
		Total	59.911	17.937	75
k	unaspirated	Generation1	40.677	5.624	25
		Generation2	58.679	10.639	25
		Total	49.678	12.394	50
	aspirated	Persian	95.117	9.388	25
		Generation1	54.826	4.831	25
		Generation2	78.837	6.954	25
		Total	76.261	18.158	75
tʃ	unaspirated	Generation1	51.040	7.959	25
		Generation2	82.277	10.263	25
		Total	66.659	18.207	50
	aspirated	Persian	117.038	10.598	25
		Generation1	67.922	7.775	25
		Generation2	96.902	7.076	25
		Total	93.954	22.005	75

The GLM univariate analysis of variance indicated that the VOT differences between aspirated and unaspirated groups regardless of the consonant types were highly significant ($F(1,500)=148.203$, $p<.001$, effect size=.153). The same test revealed that the VOT differences between the two generations of Kurmanji and Persian speakers were also significant ($F(2,500)=201.203$, $p<.001$, effect size=.415). Figure 3.8 represents the interaction plot between these two factors. Since both lines are close to parallel and the effect size is also very small, the interaction between voicing and generation is rather marginal. Since there is no unaspirated stop in initial position in Persian, the red circle on the top of the plot shows the value of aspirated Persian stops.

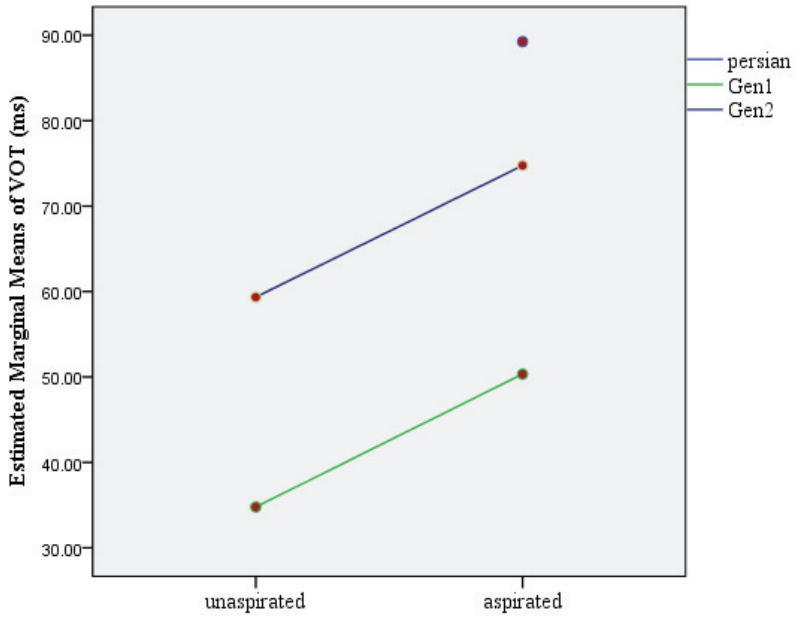
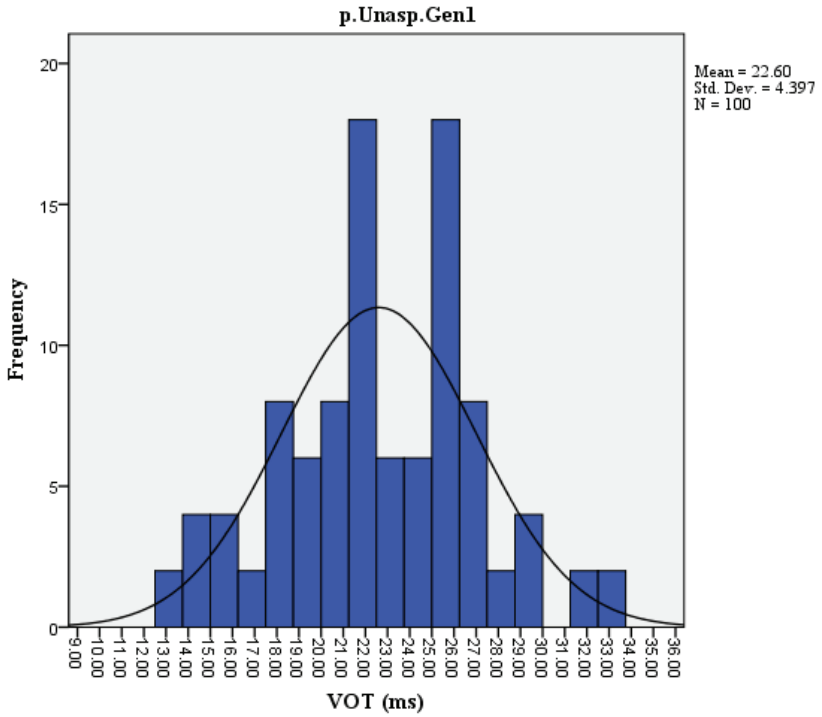


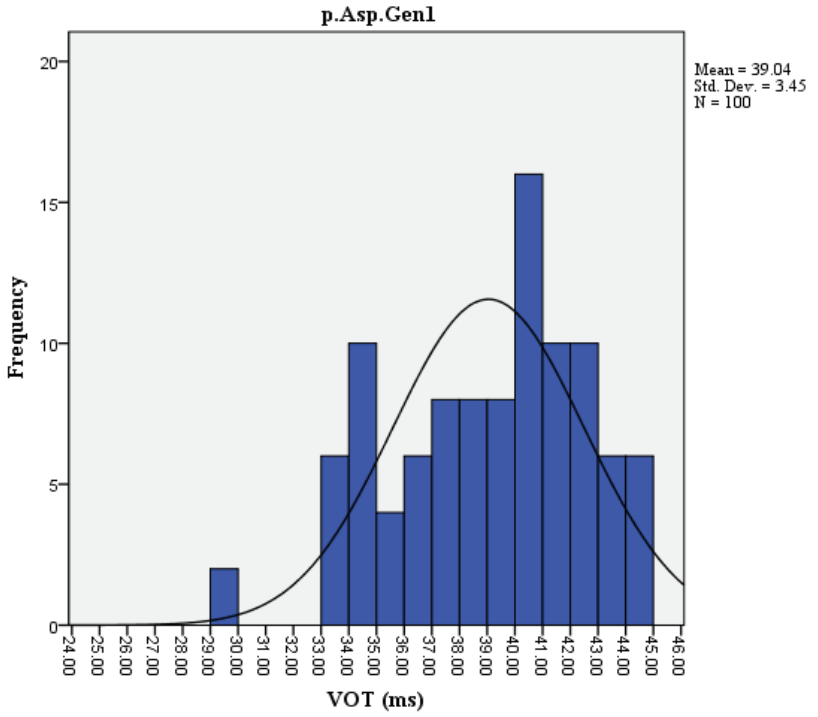
Figure 3.8. Interaction plot of VOT values in initial position for voiceless stops.

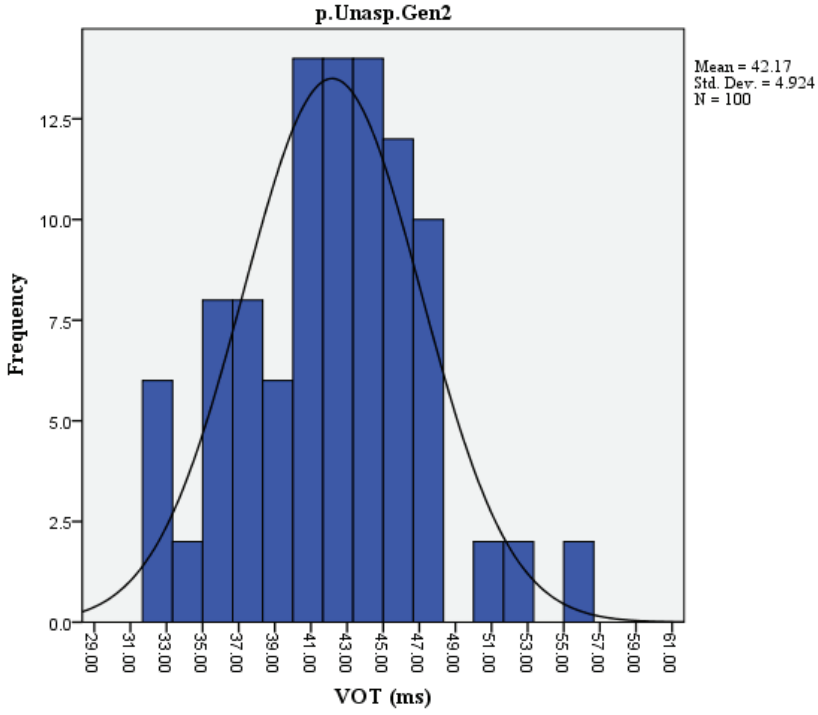
As is evident from the interaction plot in Figure 3.8, aspirated items had higher VOT values than unaspirated items in initial position. It is also evident that VOT for Persian aspirated stops is higher for Persian than for Kurmanji Generation2, than for Kurmanji Generation1.

The overall findings suggest that VOT is a powerful differentiator for Kurmanji voiceless stops, distinguished phonologically {voiceless unaspirated} and {voiceless aspirated} features.

Of course, it would not be enough to compare the means of VOT values in order to consider the latter as the acoustic correlate of voicing in Kurmanji and compare it to the dominant Persian, it is also necessary to perform a distributional descriptive test for each voiced/voiceless pair of stops. Figures 3.9–3.13 represent distributions of each pair of aspirated and unaspirated Kurmanji stops for two generations and Persian aspirated stops in initial position. It is clear from these diagrams that there was no overlap between aspirated and unaspirated phonemes in most places of articulation in Kurmanji Generation1. The only exception was for Kurmanji Generation2 for which a slight VOT overlap could be observed.




p.Asp.Gen1
Mean = 39.04
Std. Dev. = 3.45
N = 100
Frequency
VOT (ms)


p.Unasp.Gen2
Mean = 42.17
Std. Dev. = 4.924
N = 100
Frequency
VOT (ms)

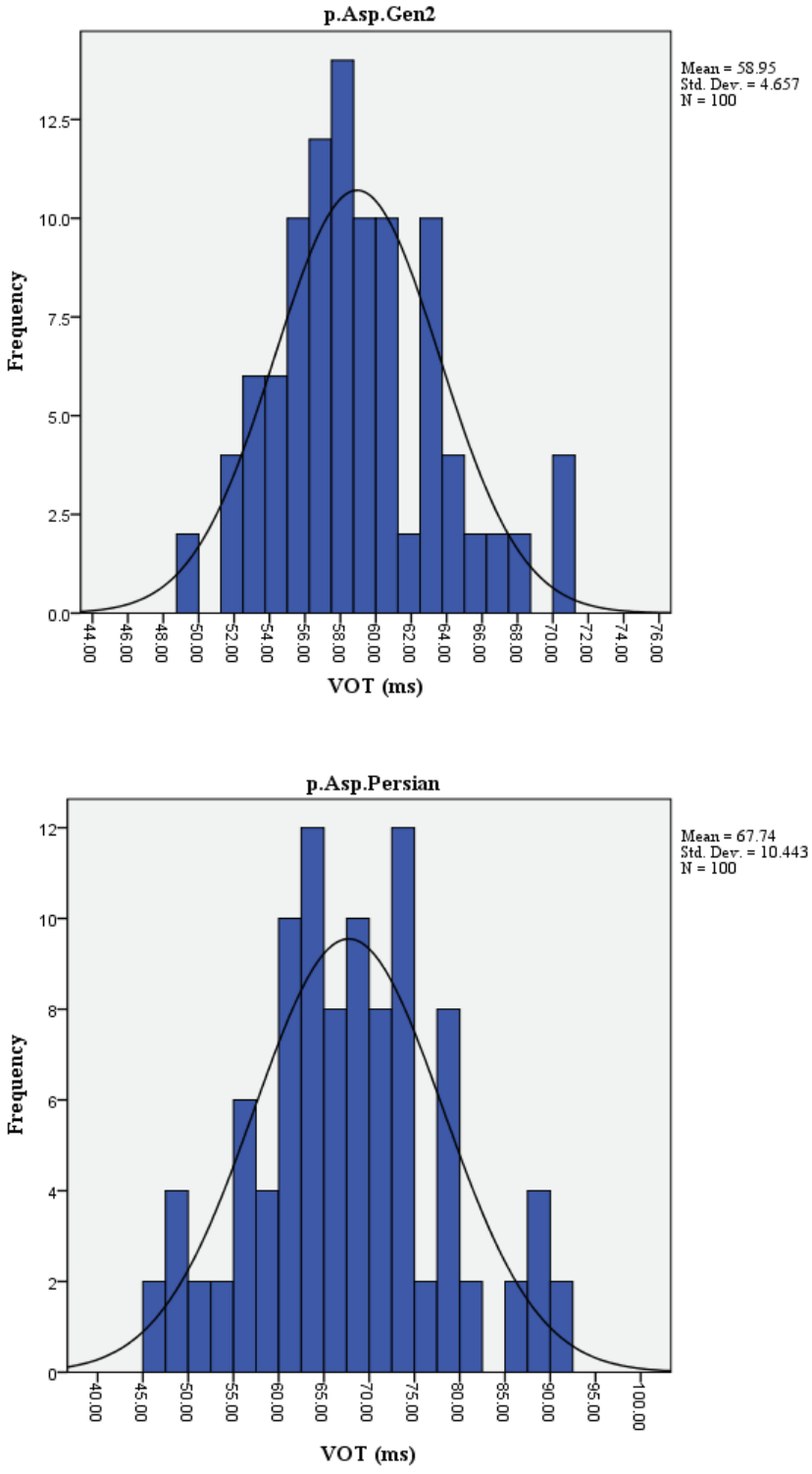
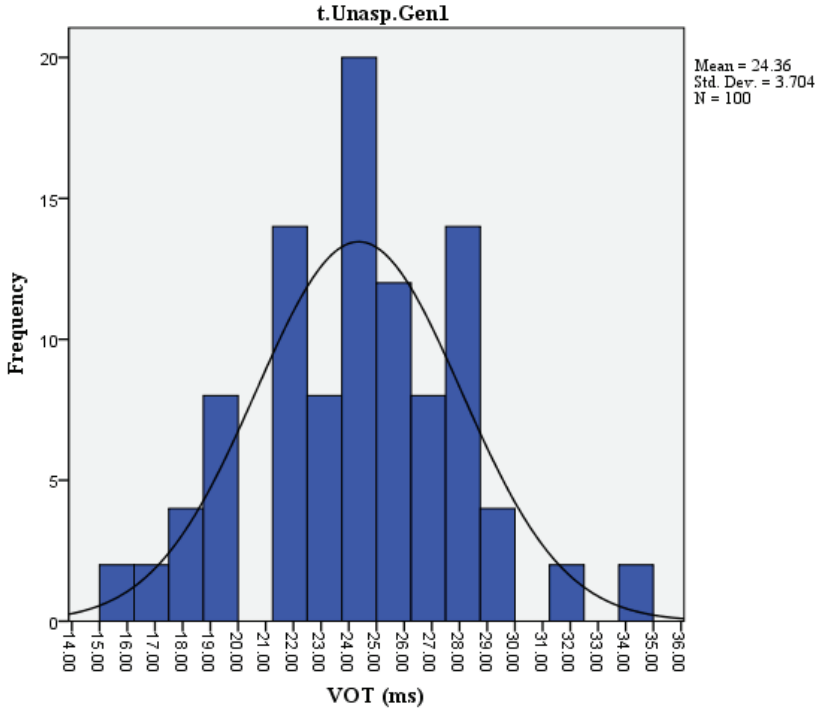
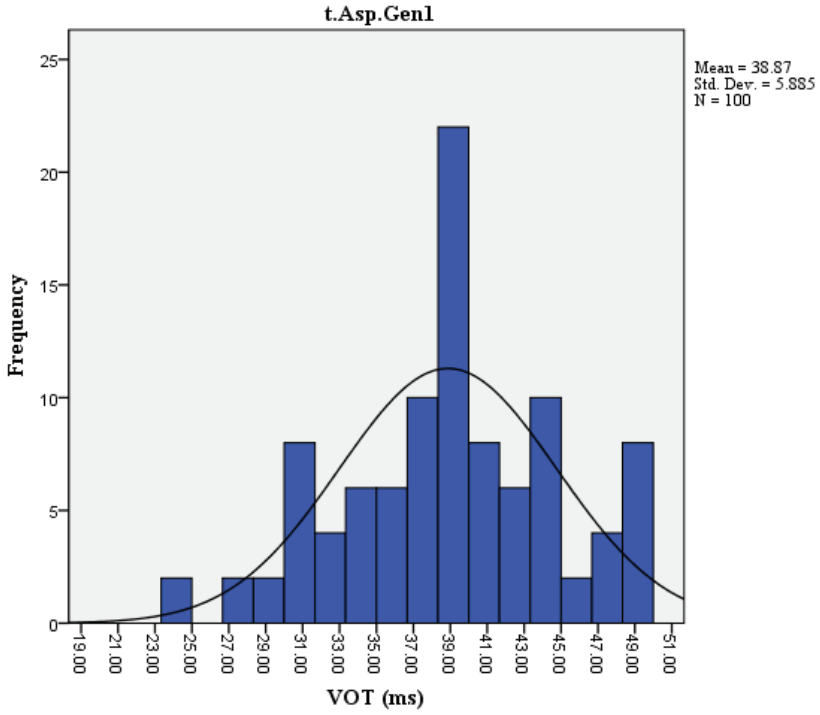
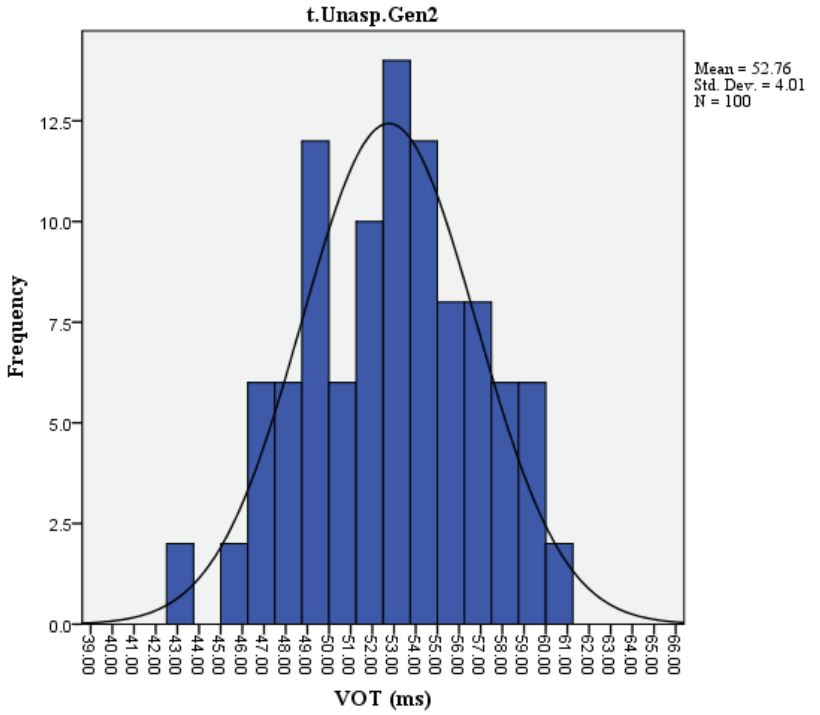


Figure 3.9. Distribution of measured VOT values for initial bilabial voiceless unaspirated and aspirated stops in two generations of Kurmanji and Persian

In the case of bilabial plosives, there is a small overlap around 2 ms between unaspirated and aspirated sounds for Generation1. There is equal overlap between aspirated and unaspirated bilabials for Generation2. This overlap is more than 10 ms for aspirated /p/ of Genreation2 and Persian. Distributional descriptive tests for each aspirated–unaspirated pair of stops indicated that there was no overlap between the aspirated phonemes of Generation1 and Persian for all places of articulation in initial position. The overlap between the unaspirated phonemes of Generation2 and aspirated phonemes of Generation1 in all places of articulations is significant. Figures 3.10 and 3.11 present the distributions of the aspirated–unaspirated dental and palatal stops as examples clearly showing that there was a distinction between aspirated and unaspirated stops in each case. In case of dental and palatal stops, although the overlap between aspirated and unaspirated values for Generation1 is very small, this overlap for Generation2 is more than 10 ms. The overlap between aspirated dental and palatal stops with their Persian counterparts are significant. This is equal for the VOT overlap observed between aspirated stops of Generation1 and unaspirated stops of Generation2.




t.Asp.Gen1
Mean = 38.87
Std. Dev. = 5.885
N = 100
Frequency
VOT (ms)


t.Unasp.Gen2
Mean = 52.76
Std. Dev. = 4.01
N = 100
Frequency
VOT (ms)

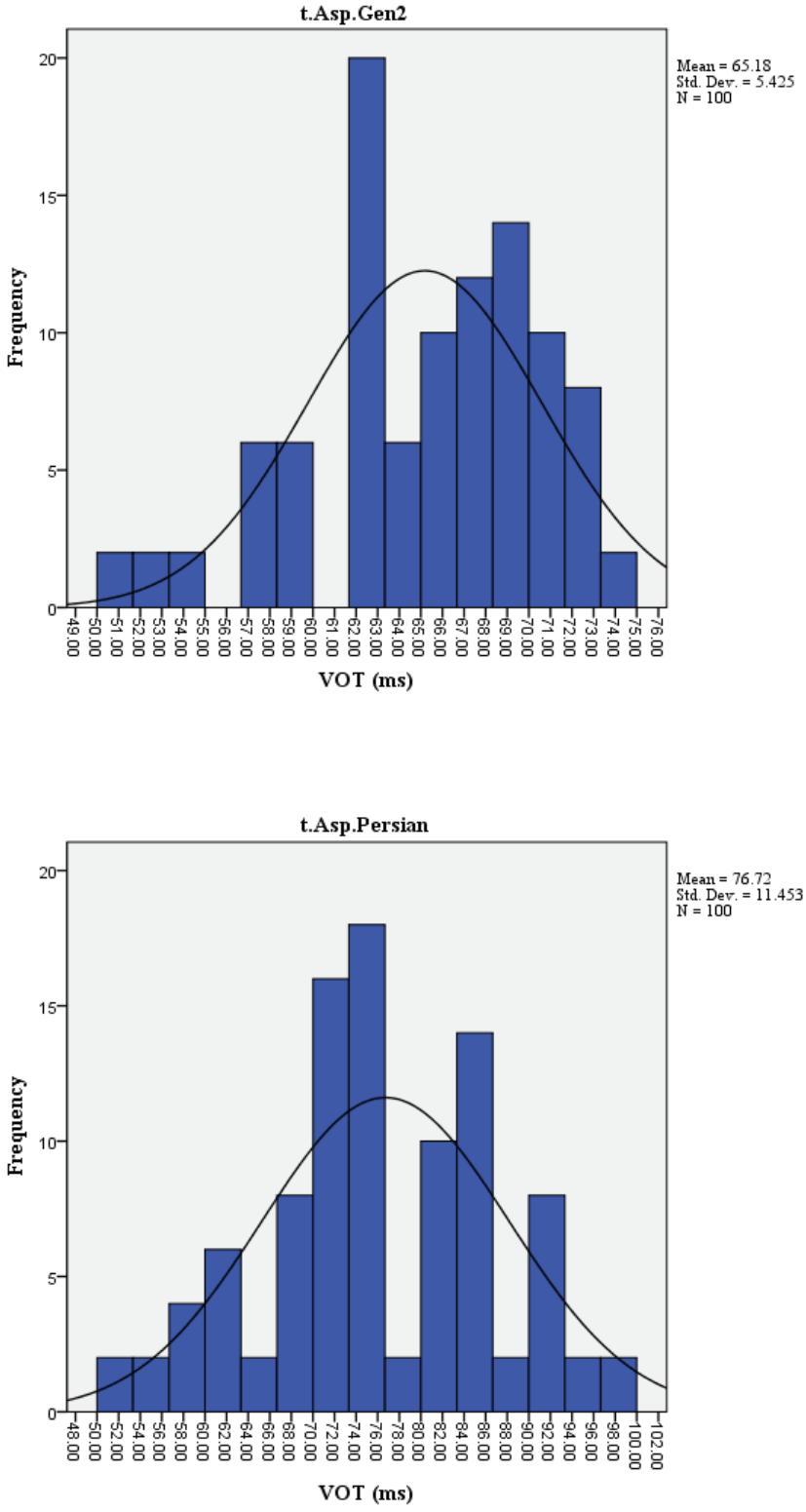
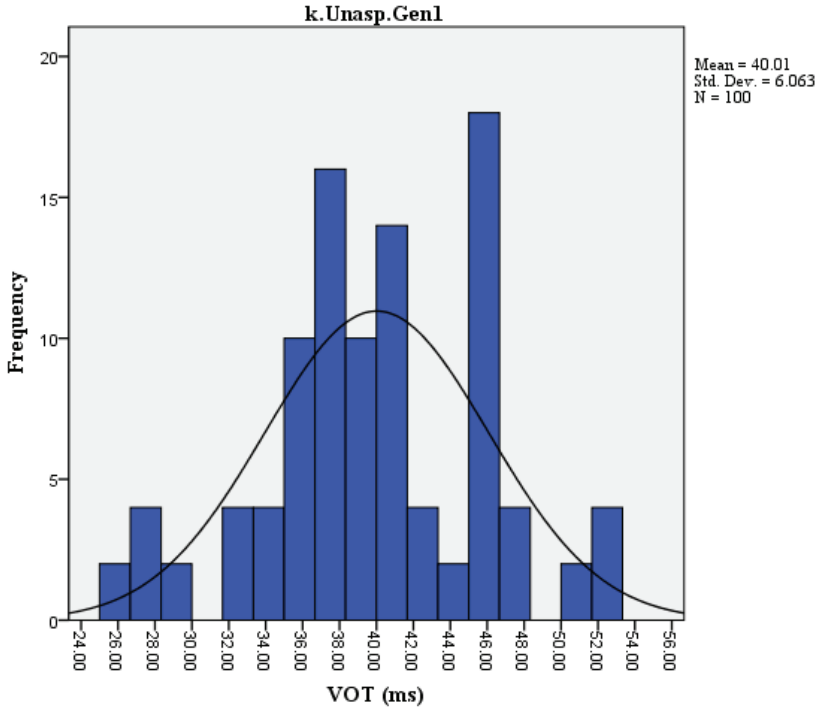
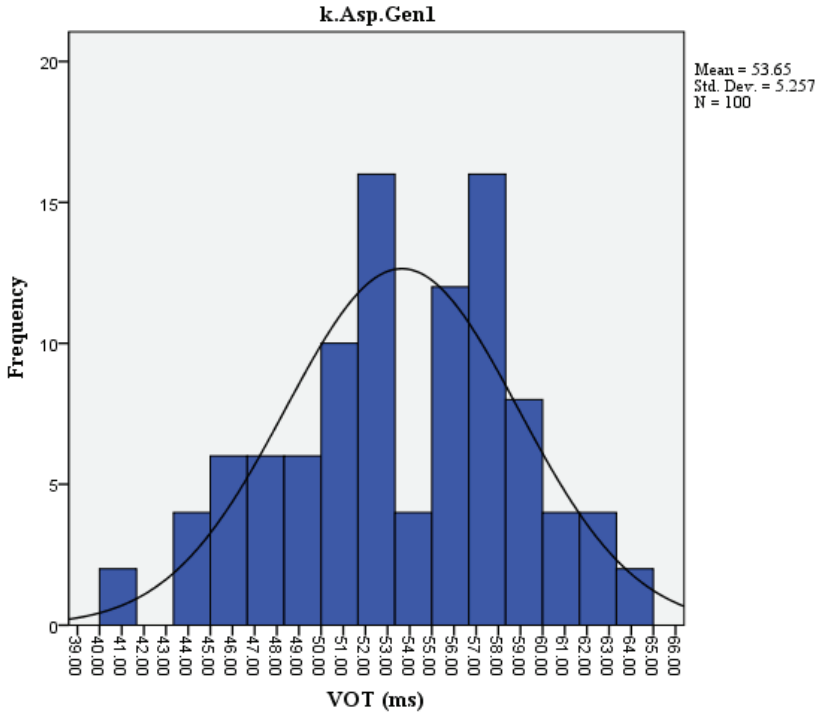
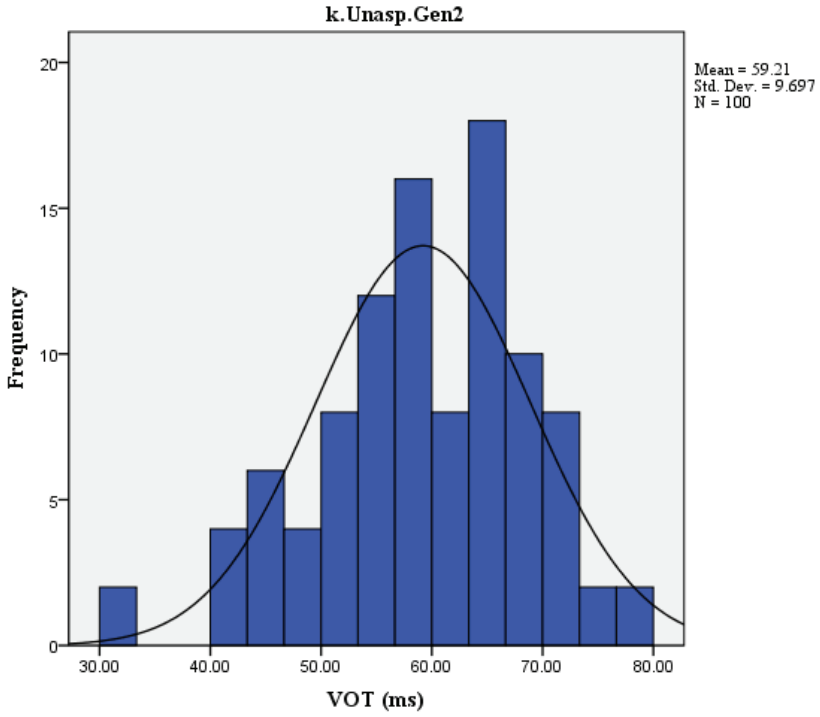
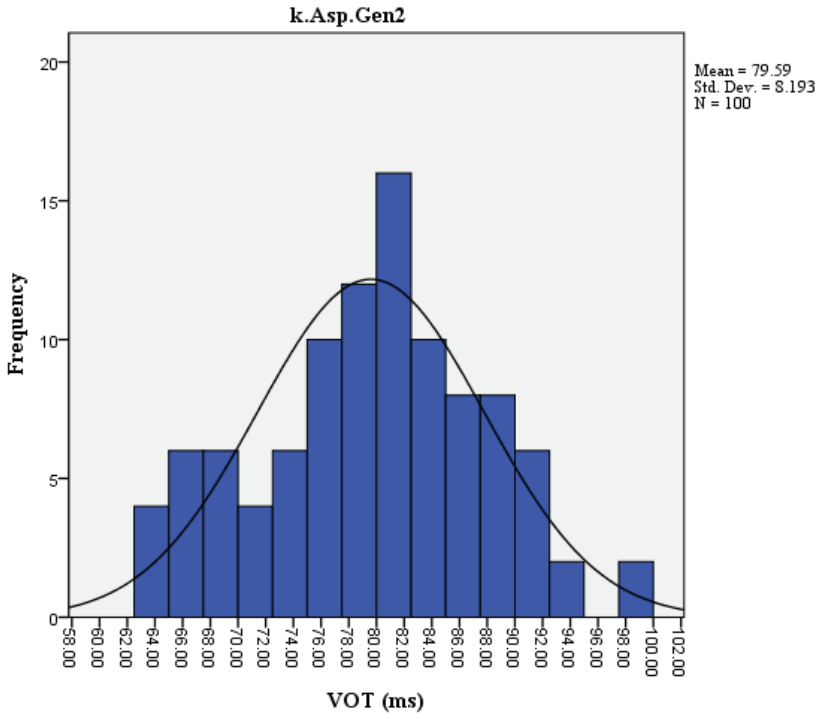


Figure 3.10. Distribution of measured VOT values for initial dental voiceless unaspirated and aspirated stops in two generations of Kurmanji and Persian


k.Unasp.Gen1
Mean = 40.01
Std. Dev. = 6.063
N = 100
Frequency
VOT (ms)


k.Asp.Gen1
Mean = 53.65
Std. Dev. = 5.257
N = 100
Frequency
VOT (ms)


k.Unasp.Gen2
Mean = 59.21
Std. Dev. = 9.697
N = 100
Frequency
VOT (ms)


k.Asp.Gen2
Mean = 79.59
Std. Dev. = 8.193
N = 100
Frequency
VOT (ms)

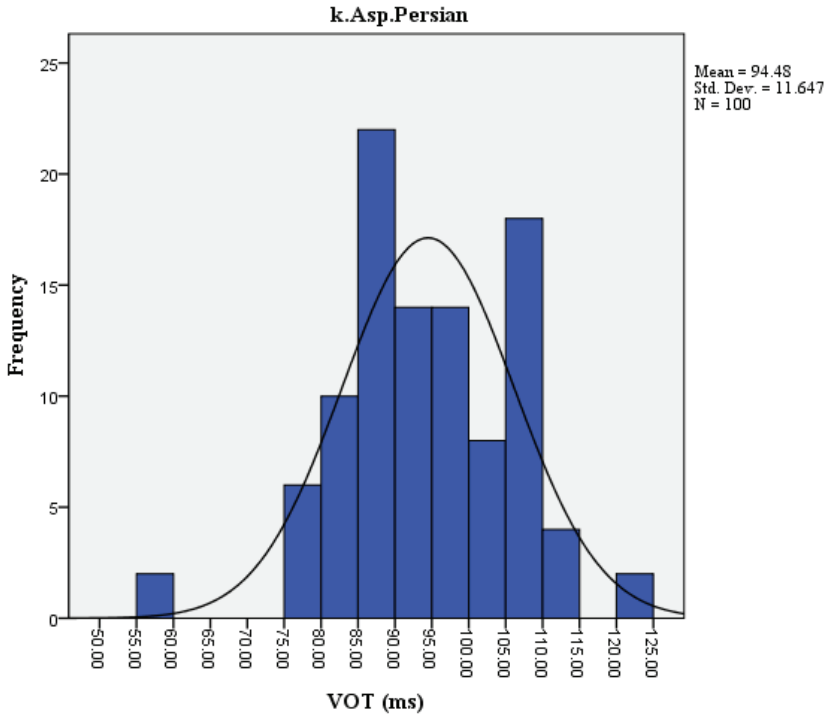


Figure 3.11. Distribution of measured VOT values for initial palatal voiceless unaspirated and aspirated stops in two generations of Kurmanji and Persian

The two stop categories occupy distinct ranges along the VOT dimension and can be identified acoustically and phonetically using this measure. There was only a slight degree of overlap between the VOT distribution of voiced and voiceless affricates in initial position. Heselwood & Mahmoodzadeh (2007) in their study of Persian coronal stops showed that the VOT measure distinguishes between voiced and voiceless affricates. Their finding was based on the comparison of means and they did not present distributional statistics for their data.

Jansen (2004) argued that VOT is secondary in signaling the voice distinction of affricates, because affricates have a longer release stage than plosives, which can overlap the aspiration phase of voiceless affricates (Jansen 2004: 58–60). Although the temporal pattern of release and aspiration for affricates is different from that of other stops, the VOT mean difference between voiceless unaspirated and aspirated affricates is noticeable. Since VOT includes both affrication and aspiration stages of stop release patterns (Figure 3.12), it may be preferable not to consider it as a secondary cue in voicing distinction of

affricates. Indeed, there are several important acoustic cues in voicing distinction of affricates. However, in order to consider one of them as primary or secondary, the appropriate perception experiments need to be conducted.

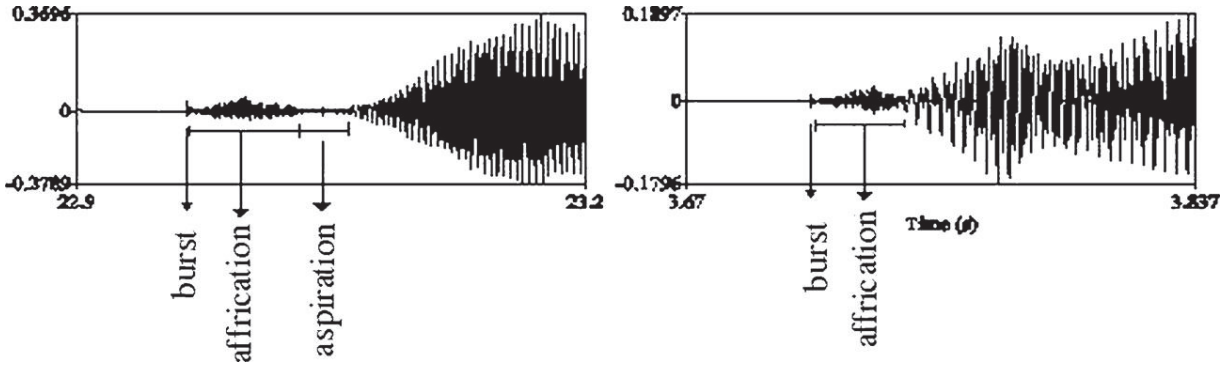
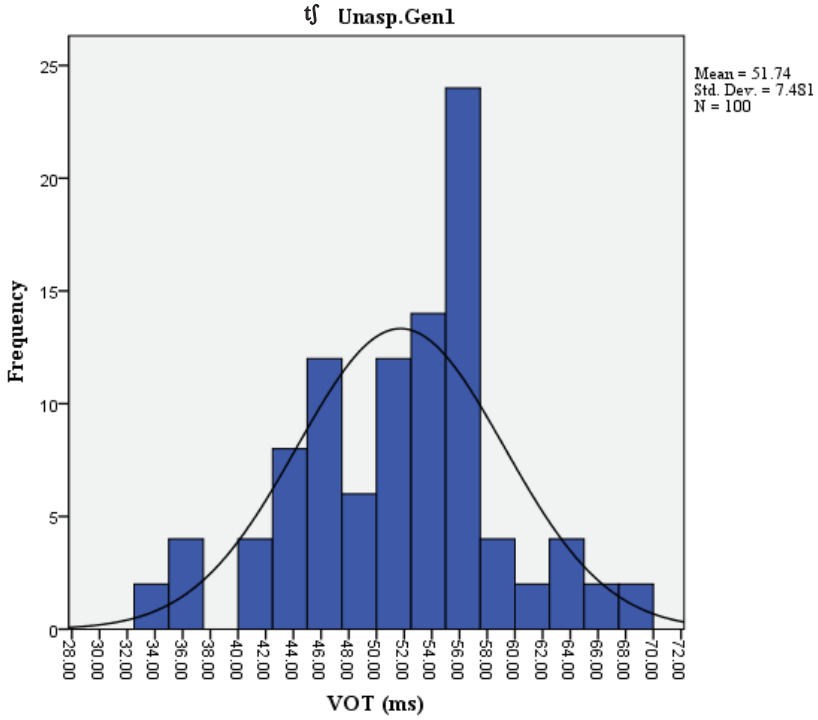
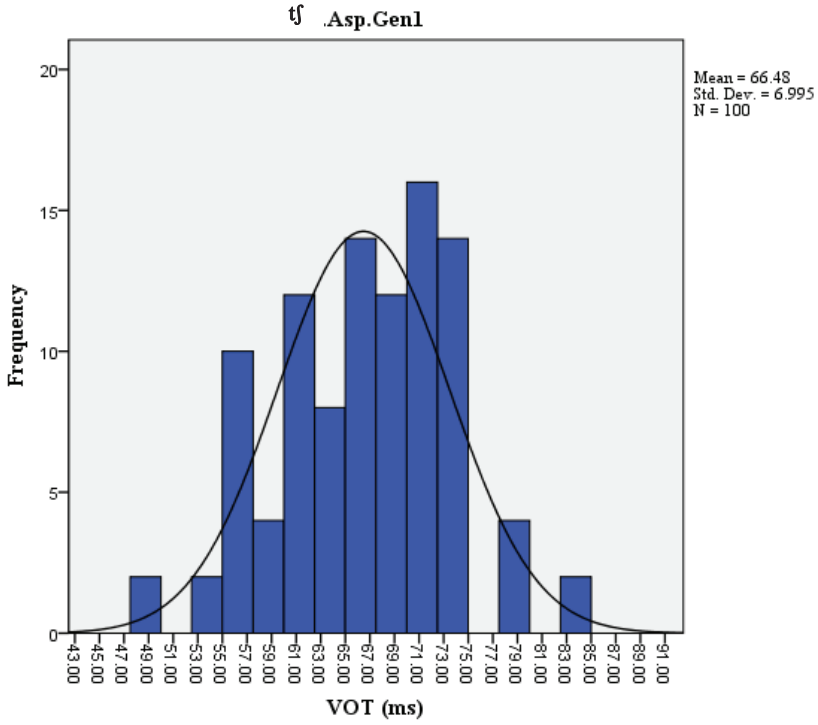
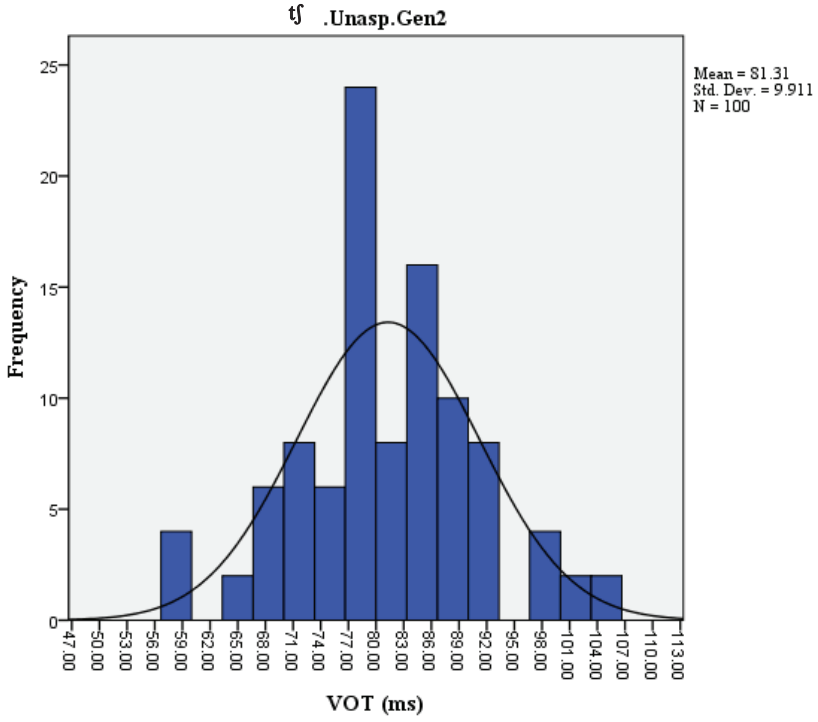


Figure 3.12. Burst and release patterns of voiceless aspirated and unaspirated affricates. [tʃʰɑ-] (left): positive VOT=114 ms; [tʃɑ-] (right): positive VOT=47 ms.




tʃ .Asp.Gen1
Mean = 66.48
Std. Dev. = 6.995
N = 100
Frequency
VOT (ms)


tʃ .Unasp.Gen2
Mean = 81.31
Std. Dev. = 9.911
N = 100
Frequency
VOT (ms)

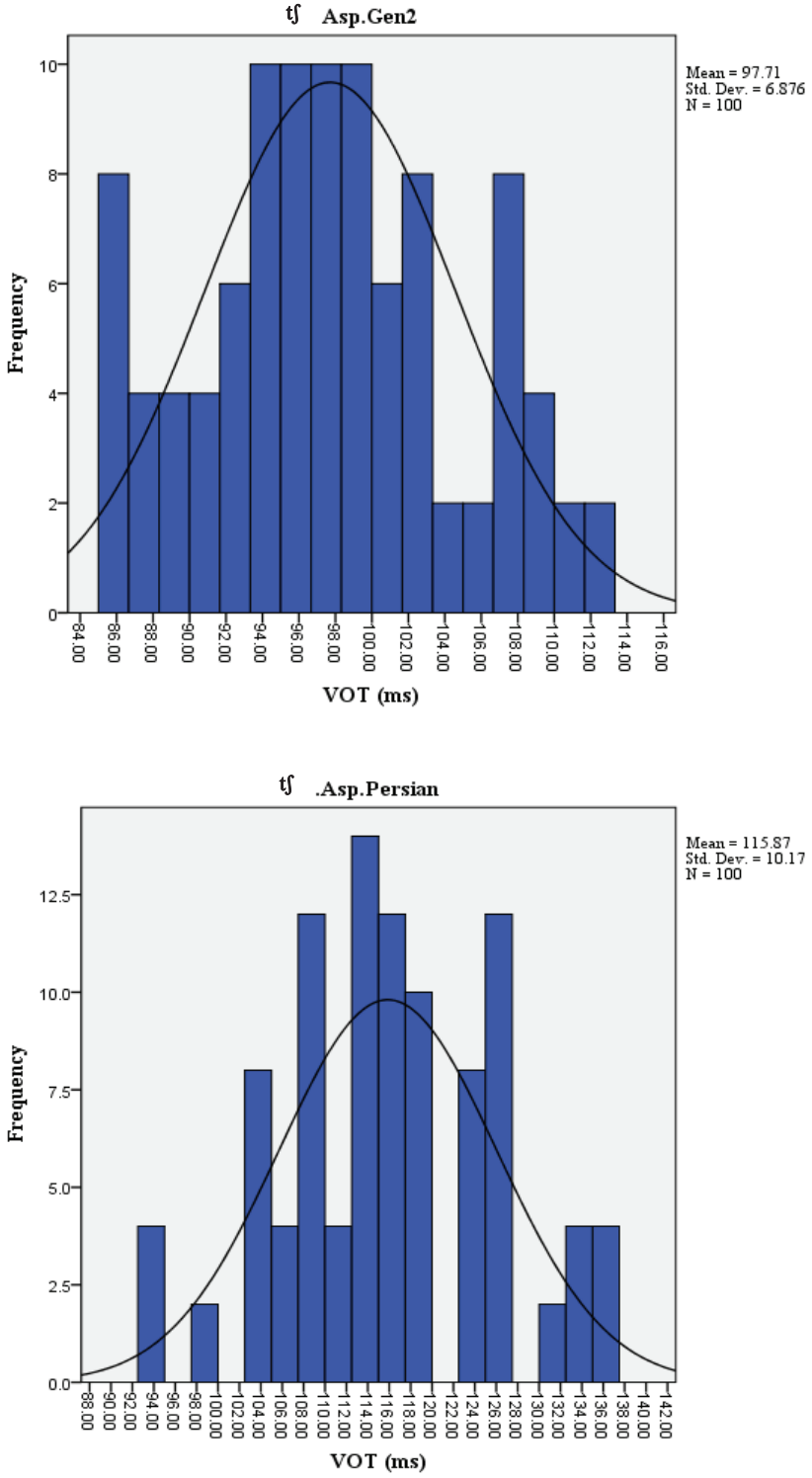


Figure 3.13. Distribution of measured VOT values for initial affricate voiceless unaspirated and aspirated stops in two generations of Kurmanji and Persian.

As discussed above, Kurmanji is said to contrast the voiceless stops as {aspirated} and {unaspirated} in initial position. Determining the phonetic categories that implement this phonological contrast was one of the main goals of this study. The mean VOT value in initial position for /p/ and /p^h/ in Generation1 is 22.6 ms and 39.04 ms respectively. For /p/ and /p^h/ in Generation2 the mean was 42.17 ms and 58.95 ms, respectively. The mean VOT value of /p^h/ in initial position was 67.74 ms. The dental /t/ and /t^h/ displayed a mean VOT of 24.36 and 38.87 ms for Generation1 respectively. For Generation2, /t/ and /t^h/ displayed the mean of 52.76 and 65.18 ms respectively. The mean VOT value of /t^h/ in initial position was 76.72 ms. The palatal /k/ displayed a mean VOT of 40.01ms for Generation1. The palatal /k^h/ for Generation1 was 53.65 ms. Mean VOT values for /k/ and /k^h/ in Generation2 was 59.21 and 79.59 ms respectively. The mean VOT value of /k^h/ in initial position was 94.48 ms. Mean VOT value for /tʃ/ and /$tʃ^h$/ in Generation1 was 51.74 and 66.48 ms, respectively. The mean VOT value for /tʃ/ and /$tʃ^h$/ in Generation2 was 81.31 and 97.71 ms respectively. The mean VOT value of /$tʃ^h$/ in initial position was 115.87 ms. These values indicate that Kurmanji speakers produced /p, t, k, tʃ/ with long lag VOT values that are quite typical of languages that employ the {vl.asp.} as well as short lag VOT values that employ the {vl.unasp} phonetic category as the implementation of the [-voice] phonological feature. In case of Persian [-voice] phonological feature, I follow the claim of Bijankhan and Nourbakhsh (2009:344) in which they noted that "Persian speakers produced /p, t, k, tʃ/ with long lag VOT values that employ the {vl.asp.} phonetic category as the implementation of the [-voice] phonological feature."

5.2. Factors affecting VOT

In this section we investigate how the parameters place of articulation, generation and the dominant Persian affect VOT.

As a preliminary screening, a 2 × 3 × 4 (Aspiration × Generation × Consonant type) univariate analysis of variance (ANOVA) was run to the mean VOT values. The ANOVA returned significant main effects of Aspiration, Consonant type, Generation as well as significant interactions between Consonant type and Generation (Table 3.5).

This study firstly asked whether VOT values vary according to consonant types. A GLM univariate analysis of variance compared four targeted consonants in initial position, /p, t, k, tʃ/. As expected, the results illustrated the high significant difference between the 4 consonant types [$F(3,480) = 598.75$, $p<0.000$, effect size = 0.789]. Based on bonferroni post hoc test VOT was significantly longer for /tʃ/ than for /k/, /t/ and /p/ ($p<0.05$). Significant differences in the VOT values according to Generation were confirmed by the same test for aspirated consonants [$F(2,480) = 692.860$, $p<0.000$, effect size = 0.743], as well as for unaspirated consonants [$F(1,480) = 540.321$, $p<0.000$, effect size = 0.530]. Bonferroni post hoc test revealed that VOT was significantly higher for Persian compared to Kurmanji Generations, and higher for Generation2 than Generation1 ($p<0.05$) (see also Zirak and Skaer 2013b).

Table 3.5. ANOVA results for the mean VOT values based on Aspiration, Consonant types and Generation.

Tests of Between-Subjects Effects

Source	df	F	Sig.	*Pη2*
Aspiration	1.00	429.43	0.00	0.47
Consonant Type	3.00	590.00	0.00	0.79
Generation	2.00	963.02	0.00	0.80
Aspiration * Cons. Type	3.00	1.93	0.12	0.01
Aspiration * Generation	1.00	0.01	0.92	0.00
Cons. Type* Generation	6.00	11.97	0.00	0.13
Aspirate * Cons. Type * Gen	3.00	2.17	0.09	0.01

(Adjusted R Squared = .910)

The interaction of consonant types and Generation was also significant in both aspirated and unaspirated items. Tables 3.6 and 3.7 represent the results of univariate ANOVA to investigate the VOT contrast distinction in detail. There is a significant difference between the means of aspirated items in each consonant type according to Generation. Bonferroni post hoc test revealed that mean differences of VOT between Generation1 and Persian are significantly higher than between Generation2 and Persian in each aspirated consonants (38.912 ms and 14.498 ms respectively, P<05). Moreover, the differences between the VOT values of Generation1 and 2 (24.414 ms, P<05) also indicates that Generation2 tend to produce long lag VOTs compared to Generation1. The same result found for unaspirated stops in which the VOT produced by Generation2 was higher than Generation1 (mean difference = 24.559 ms p<0.05). The observed data analysis indicates that however the VOT differences between Generation2 and Persian is decreased, the contrast is still significant.

Table 3.6. Significant VOT differences of unaspirated consonants: Effect of Generation

	F(1,480)	p	*Pη2*
p	94.324	0.00	0.164
t	181.613	0.00	0.274
k	72.547	0.00	0.131
tʃ	218.511	0.00	0.313

Table 3.7. Significant VOT differences of aspirated consonants: Effect of Generation

	F(2,480)	p	*Pη2*
p	93.622	0.00	0.281
t	167.952	0.00	0.412
k	184.013	0.00	0.434
tʃ	273.08	0.00	0.532

Figures 3.14 and 3.15 contain interaction plots between consonant types, Aspiration and Generation factors which affect the VOT values. The first interaction plot shows the mean VOT of Generation1 compared to dominant Persian, whereas the second interaction plot indicates the increases of VOT value as Generation2 progress, as predicted. The observed differences in Figures 3.14 and 3.15 were also confirmed statistically. The data presented above illustrates that all speakers in Generation2 maintain the contrast between aspirated and unaspirated initial stops, using a combination of phonetic features. The distribution of the data does not indicate a categorical shift to the Persian category, but rather suggests the approximation of the unaspirated and aspirated categories. These findings supports the assertion made in Campbell and Muntzel (1989) in which the authors predict that variability in production increases the function of the level of language obsolescence. Babel (2008) had similar results with his data from Northern Paiute. The youngest speaker maintained the phonological patterns of the deceased generation, but the categories were less distinct. This trend suggests that later generations of speakers of obsolescing languages may not necessarily lose contrasts but exhibit increased subphonemic variation, causing the category boundaries to become less discrete (Babel 2008).

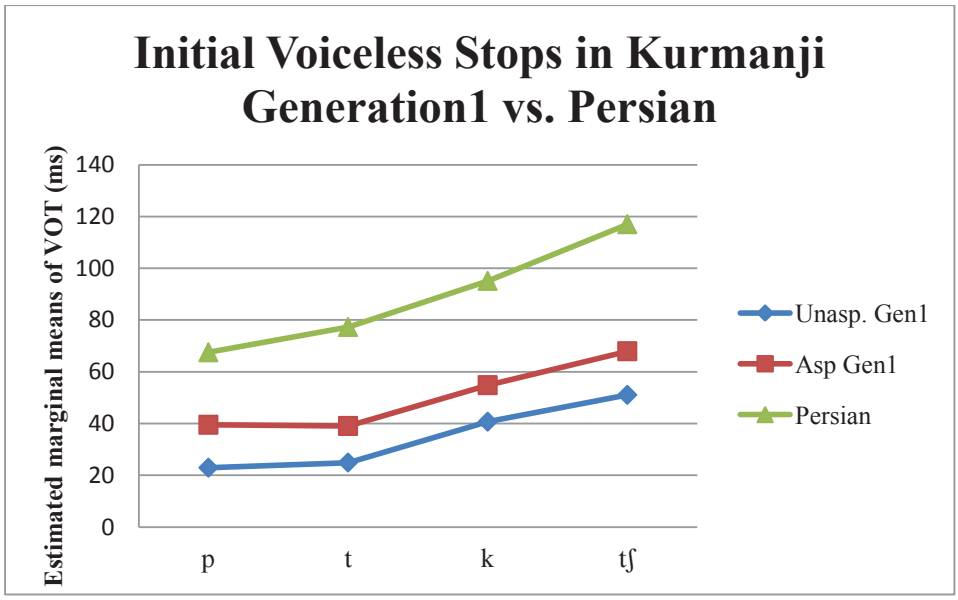


Figure 3.14. Interaction plots representing the mean VOT changes (ms) between Generation1 and the effect of Persian aspirated stops.

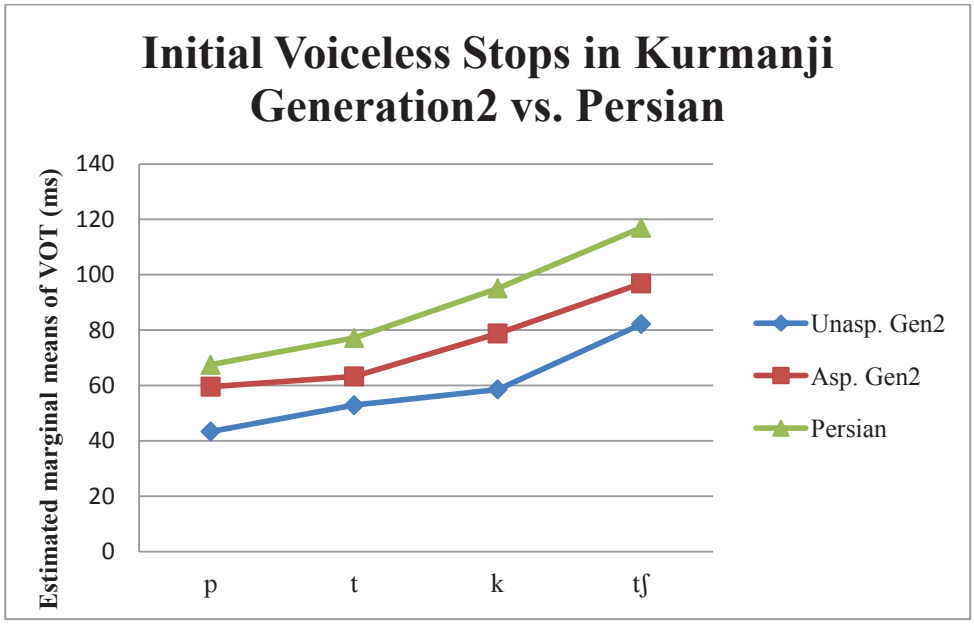


Figure 3.15. Interaction plots representing the mean VOT changes (ms) between Generation2 and the effect of Persian aspirated stops.

Analyses of VOT values by place of articulation mostly replicate the previous studies in this regard. Many studies have reported that the further back the closure, the longer the VOT values would be (Peterson & Lehiste 1960, Klatt 1975, Zue 1976). The results presented in Figures 3.14 and 3.15 show that dentals have higher values than bilabials, and palatals have higher values than dentals. These findings could be explained by general aerodynamic and physiological laws. For voiceless plosives, on the other hand, the glottis is open and there might be a ceiling effect, i.e. intraoral pressure equalizes subglottal pressure, no matter where the closure in the oral cavity is produced, the limit is the subglottal pressure (Cho & Ladefoged 1999: 213).

Cho & Ladefoged (1999), in their cross-linguistic study of the relation between VOT and place of VOT showed that it may depend on aerodynamic circumstances, the mass and mobility of different articulators, temporal adjustment between the closure duration and VOT, and perceptual factors. These factors are given different weights in different languages, resulting in variations across languages in the way contrasts in VOT are manifested (Ladefoged & Cho 2001). When there is a long, narrow constriction, the Bernoulli Effect causes the articulators forming the constriction to be sucked together.

The Bernoulli Effect is larger if the contact area is more extensive. Consequently, the decrease in intraoral pressure after the closure is more gradual for the more extended closure areas.

From a sociolinguistic perspective one interpretation of the consistent effect of generation on VOT for voiceless stops would be that it reflects a change in "apparent time", with the younger generation moving to enhance the audible aspiration of /p t k/. However, these findings must also be evaluated in light of previous studies of the effects of age on the acoustic properties of speech (Ryalls et al., 1997) which provide evidence that, across languages, younger speakers tend to have longer VOTs overall for voiceless stops than older speakers (although the [presumably] physiological basis for this has not been established).

Later generations appear to have returned to patterns found in the speech of earlier members of the community and fortition has clearly established itself a salient social and regional marker today, transcending the bounds of its original ethnic communities. Kurmanji VOT exhibited the expected pattern of drift from short-lag to long-lag VOT, with the biggest increase occurring between Generation1 and Generation2. This is likely because Generation2 speakers in the region do not form a cohesive Kurmanji community and therefore have little opportunity to talk casually in Kurmanji outside the home. In contrast, an active Persian community creates ample opportunity for casual speech with younger generations. Thus the VOT of Generation2 speakers is more rapidly pulled towards the dominant community norms. However Generation1 and Generation2 Kurmanji continue to value their language and heritage, illustrated by the Kurmanji's cross-generational gradual change. The evidence of some exceptional VOT values among speakers of the two generations can be attributed to inter-speaker variability. Some Kurmanji Generation1 and Generation2 speakers had VOT values considerably higher than typical for their groups. The VOT of one Generation1 Kurmanji was similar to the average for Generation2, while the VOT of another in Generation2 was higher than the average for Persian. These differences, reflecting individual and family lifestyle differences, might be eliminated by increasing the sample size. Future work will

accomplish this, examining VOT in the other languages in the corpus, and comparing VOT to other linguistic variables, in the hopes of better understanding contact-induced language change considering both phonetic and social factors when building accounts of phonetic variation, and the need for these to be integrated within models of speech production.

6. Discussion

In trying to account for what was known about VOT in different languages at the time, Keating (1984:289) proposed a model in which there are "only as many phonetic categories given by the phonetic features as there are contrasting phonetic types in languages." As necessary evidence, she showed that in order to achieve not only phonological generalization but also the contrasting phonetic differences between languages such as English and Polish /p, t, k, b, d, g/, there are two different levels of representations in the grammar. At the first level, various phonetic kinds of /b, d, g/ are defined by the feature [+voice] in both languages. At the second level, the phonetic features further distinguish stops in English from those in Polish by the use of three phonetic categories {voiced}, {voiceless unaspirated} and {voiceless aspirated}. In Polish, as in other languages without aspiration such as French, the phonological features [+voice] and [-voice] are realized as {voiced} and {voiceless unaspirated}, respectively, whereas the phonological features [+voice] in English is usually realized as {voiced}, but can be sometime realized as {voiceless unaspirated} (e.g., word-initially); similarly English [-voice] can be either {voiceless unaspirated} or {voiceless aspirated}, depending on the context (cf. Docherty 1992). Keating notes that the implementation of the phonologically identical feature Voice is different in different languages, but the categories are chosen from a "fixed and universally specified set" which allows only three discrete phonetic categories {voice}, {voiceless unaspirated}, and {voiceless aspirated} without "fuzzy areas of a continuum". In Keating (1990), these three discrete phonetic categories are represented under Aperture Theory (cf. Steriade 1989, 1993):

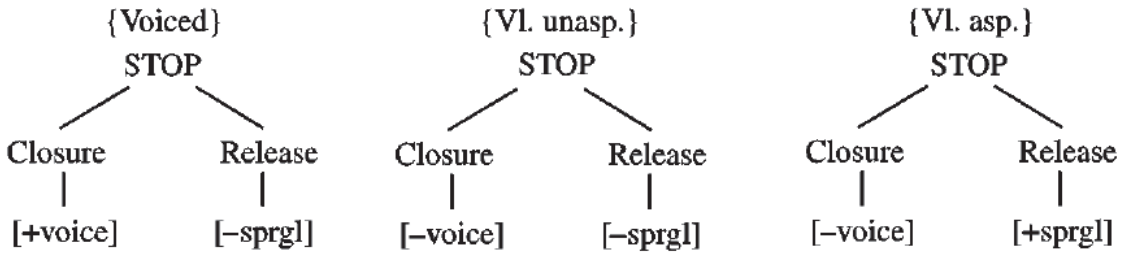


Figure 3.16. Voicing categories in stop consonants (Keating 1990; Cited in Cho and Ladefoged 1999: 225)

Keating's approach has many similarities with that of Ladefoged and Maddieson (1996; see also Ladefoged, 1997). Cho and Ladefoged (1999) differ from Keating in much the same way as Docherty (1992). They consider what might appear to be phonetic categories as at best modal values within the continua formed by the physical scales - the parameters - that define each feature.

They wanted to be able to characterize contrasts within languages (phonological differences) as well as phonetic differences between languages. They suggest that there is a phonological feature, VOT, definable in terms of the difference in time between the initiation of the articulatory gesture responsible for the release of a closure and the initiation of the laryngeal gesture responsible for vocal fold vibration. This is a somewhat different definition of VOT than the traditional phonetic definition, in which VOT is considered to be the interval between the release of an articulatory gesture, usually a stop, and the beginning of vocal fold vibration.

If, for phonological purposes, one redefines VOT as the interval between the gestures involved, then the values of this feature cannot be determined by direct observation. They become largely unmeasurable without invoking some of the notions of articulatory phonology as described by Browman and Goldstein (1990, 1992). Articulatory phonology regards gestures as being realized by a task dynamic model (Saltzman 1986; Saltzman & Munhall 1989; see also Hawkins 1992) that would, when fully worked out, take care of the physiological and aerodynamic influences on voicing lag that I have been discussing. The data I have been discussing seem fully compatible with this possibility. Comparing the two target languages investigated in this study which

contrast [+voice] and [-voice] in initial position, the voicing contrast, [+voice] and [-voice], in Persian stop consonants in initial position can be realized as {voiceless unaspirated} and {voiceless aspirated} respectively. Compared to Persian, the phonological features [+voice] in Kurmanji is realized as {voiced}, similarly [-voiced] is considered as {voiceless unaspirated} and {voiceless aspirated}.

This should not, however, be taken as an endorsement of all the notions of Browman and Goldstein's Articulatory Phonology. In this chapter my major concern is just the description of the phonetic facts about VOT, noting how some of them can be considered to be due to physiological and aerodynamic causes whereas others require language specific specification.

In general, speakers do not deliberately produce different values of the feature VOT for different places of articulation. From the data I have presented it appears that, for the Kurmanji language, it might be able to account for differences due to places of articulation - if we only knew enough about the exact articulatory movements involved. It is likely that speakers aim for a certain timing difference between articulatory and glottal gestures irrespective of the articulatory gesture involved. This is the low-cost option suggested by Docherty (1992). The observed VOT is just the inevitable consequence of the physiological movements and the aerodynamic forces.

There is, however, plenty of evidence that languages differ in the targets that they choose. My data show that even if we could measure VOT in terms of the difference in time between the initiation of the articulatory gesture and the initiation of the laryngeal gesture, there are still large differences between languages. All the measured VOTs are for virtually the same articulatory gesture, and should therefore reflect comparable intervals between the initiations of the gestures. Nevertheless, they show unpredictable variations between languages. They have only three VOT distinctions, and use some other action of the larynx, specified by one or more other features, to make these additional contrasts. So in a phonological description we need not consider more than three values of VOT. But phonology is concerned with only one language at a time. From the point of view of a phonetic theory that will allow us to specify all the ways in which

one language may differ from another, we need a more detailed specification of VOT. There is a continuum of possible VOTs from which languages may choose. The relation between the phonological units and the physical output in a language is illustrated in Figure 3.17. So lexical specifications in a language are made in terms of possible modal values of phonological features such as, for the feature VOT, [voiced] vs. [voiceless unaspirated] vs. [aspirated]. The language-specific phonetic rules then assign target values for timing between the initiation of the articulatory gesture and the initiation of the laryngeal gesture. (In the current articulatory phonology, such temporal specification is made in the gestural score.)

These two processes, the choosing of an appropriate modal value and the assignment of a target for this value, are conducted by the grammar specific to the language. In many cases these actions would account for all the observed differences between this language and others, as well as for contrastive differences such as those between [voiceless unaspirated] and [aspirated] stops within the language and for the allophonic differences due to the place of articulation. It might, however, be necessary for the grammar of a particular language to specify more than one target for a given modal value. There are cases in which, even if we knew everything about the articulations involved, we would not be able to predict the differences in VOT associated with the place of articulation. We would need extra statements within the grammar of the language. Knowing all about the articulations will be insufficient, for example, if the VOT differences were deliberately introduced as perceptual cues to the place of articulation in aspirated stops. A language might have voiceless unaspirated stops for which a single target value of VOT would be sufficient. We listed in the introduction six reasons for variations in VOT of which the first four provided ample support for physiological and aerodynamic differences being sufficient to account for place differences. But, we were unable to provide equally convincing reasons for VOT variations among aspirated stops.

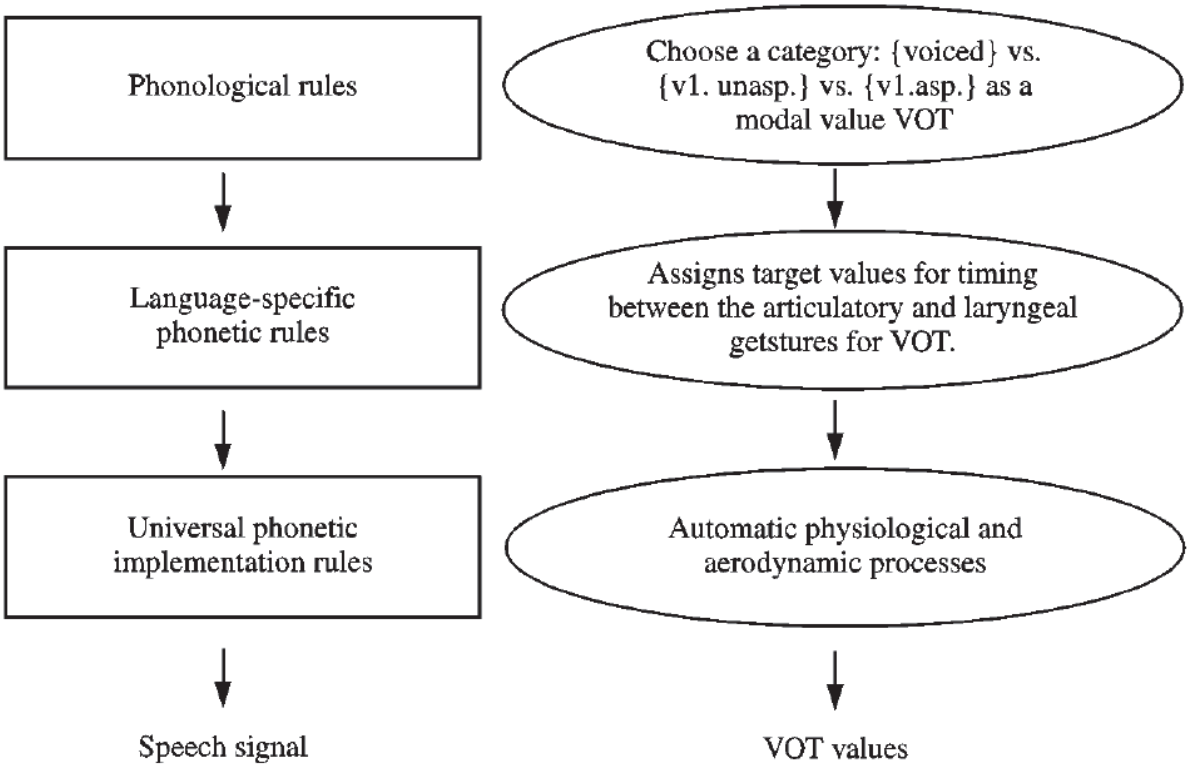


Figure 3.17. Multiple processes from phonology to speech signal. The model adopted here is based on Keating (1985, 1990) and Cohn (1993).

Specific values for each place of articulation might be required in the grammar for aspirated stops. This means that the grammar of the language would be supplying context - restricted values for features. The value [aspirated] would correspond to one target when it is in the context [velar] and another when it is in the context [labial]. There is nothing new in this notion (Ladefoged 1992). Feature definitions are often context - restricted. For example, when describing English vowels, [high] will have one target value when it is in the context [front] and another when it is in the context [back], irrespective of whether one specifies the targets in terms of formant frequencies or height of the tongue. Similarly, what one means by [alveolar] is different for a stop and a lateral. Accordingly, it should be no surprise that the target for [aspirated] in the case of velar stops might be different from that for [aspirated] for bilabial stops. These possibilities are permitted by the model outlined above. After all these language-specific factors have been taken into account, the values assigned for the timing of the targets will still be

abstract (as is the case for the comparable gestural score in articulatory phonology). These abstract values are converted to real timing values by universal implementation rules. These rules enable the task dynamic system to use the physiological and aerodynamic constraints to take care of the observed differences due to place. In this way it could be accounted for all the variations in VOT (Cho and Ladefoged, 1999).

In §2 I considered both internal and external evidence for the relative unmarkedness of voiceless aspirated stops vis-à-vis voiced stops and plain voiceless stops. The strongest internal evidence comes from phonological distributions, such as the elsewhere status of aspiration in Kurmanji voiceless stops, and from neutralization in first and second language phonological systems. External evidence for the relative unmarkedness of aspiration is ample; I have considered a number of relevant cases from language change. Pulling back even further to the larger goals of this chapter, closer examination of phonological and phonetic evidence suggests that:

(i) the maximally unmarked single-series stop is voiceless and aspirated stops in Kurmanji;

(ii) the unmarked/more learnable two-way laryngeal opposition is between unaspirated and aspirated stops ($T:T^h$), with the boundary between the two set at the (long-lag) value.

A larger consequence of this proposal is that we cannot simply state that a given segment type is more or less marked than its counterpart based on its featural composition; we must instead consider the structure of the system of oppositions as a whole and perhaps positional considerations as well (cf. Battistella 1990: 132, Givo´n 1995: 27). This idea of course is not new, owing its core to Saussure, Jakobson and Trubetzkoy, but it has recently been insightfully elaborated by Rice (1999), who states (contra e.g. Lombardi 1995) that:

a. Markedness cannot be defined in a single way.

b. Standard diagnostics for markedness, implication and frequency are unrevealing, leaving phonological patterning as the major evidence for markedness relations.

c. Inventories play a role in determining markedness: Depending upon the contrasts within a feature class, different features can emerge as unmarked with respect to submergence of the unmarked. (Cf. also Flemming 2005.)

d. Variation in markedness exists: Two languages with identical surface contrasts within a class may have different unmarked features with respect to both submergence and emergence of the unmarked.

These findings in particular show that comparative evidence of Kurmanji and the dominant Persian heightens the probability of the internally motivated and externally motivated changes may occur alongside each other, even affecting the same part of the phonemic inventory.

VOT values in Kurmanji exhibited the expected pattern of drift from short lag to long lag VOT with the significant increase occurring between Generation1 and Geneartion2. This is likely because Generation2 speakers in northeast of Iran do not form a cohesive Kurmanji community compared to Generation1 and therefore have no opportunity to talk casually outside home, thus, they merge into the dominant Persian and the VOT value of Generation2 speakers is rapidly pulled through the VOT value of the dominant Persian (see also, Zirak and Skaer 2013a).

Approximation occurs when two phonologically distinct phonemes shift in the direction of each other until they are acoustically indistinct. Sound changes involving approximation are comprised of gradual subphonemic changes prior to the completion of the change. A phonological category is transferred when one phonological category is adopted and implemented into a lexical item as a form of lexical diffusion until it completely replaces the previously existing category. Approximation represents an underlying path of gradient, subphonemic variation. Conversely, transfer assumes that the

sound change was a categorical shift or an articulatory leap. This terminology will be adopted below in the discussion of sound change in Kurmanji.

The fact that speakers of an obsolescing language are expected to make fewer phonological distinctions, yet maintain distinctions in the obsolescing language that also exist in the dominant language, and phonological distinctions with a low functional load should be lost prior to those with a high functional load (Palosaari and Campbell 2011; Andersen 1982), offers two feasible approaches to the investigation of sound change in the present study. First this point of view emphasizes the effect of the phonological structure of the dominant Persian as the causal factor in the loss of oppositions in Kurmanji (external motivation): There is no similar contrast in voiceless initial stops in Persian consequently; this contrast in Kurmanji is left more vulnerable to loss. This contrast is in fact maintained in Generation2, the distance between categories simply decrease. Second, the markedness view, on the other hand, suggests that the marked nature (unnaturalness due to the difficulty of pronunciation) may contribute to its merger with the unmarked feature: Considering the voiceless aspirates (T^h) as less marked than plain voiceless stops (T) and the fact that aspiration contrasts D/T:T^h are less marked than voicing contrasts D:T, (T) in Kurmanji tends to change to (T^h).

Thus the lack of aspirated/unaspirated distinctions in dominant Persian and the tendency to reduce markedness conceivably could have worked in concert, jointly leading to the loss in Kurmanji through convergence with Persian. These findings support the assertion made in (Campbell and Muntzel, 1989) in which the authors mentioned examples of previously obligatory rules becoming optional in obsolescence and resulting in free variation. This situation fits well into the notion of an obsolescing language being imperfectly learned in that it is subtractive: A language structure is forgotten or omitted.

It is clear that categorical changes, loss of allophones, and sub-phonemic variation are all characteristics of sound change in obsolescing languages. The extent to which sound changes have occurred in the Kurmanji language based on Generation is considered through instrumental phonetic investigation in this chapter. Acoustic correlates of the voicing distinction showed that the voicing contrast can be viewed as a

three way distinction in the timing of vocal fold vibration. Subtle changes in these timing relationships cause increasingly gradient subphonemic effects in younger generations compared to older generations. It can be predicted that phonological changes in obsolescing languages that rely on specific timing relationships, like the narrowing of the aspirated/unaspirated contrast in younger generations of Kurmanji speakers, suggest that later generations of Kurmanji speakers may not necessarily lose contrasts, but may exhibit approximation-like sound changes, not categorical phonological transfer (see also, Zirak and Skaer 2013b).

Chapter Four

Initial Consonant Clusters in Kurmanji and the Dominant Persian

CHAPTER 4:
Initial consonant clusters in Kurmanji and the dominant Persian

1. Introduction

Most studies on obsolescing language situations deal with gradual change, the loss of language in language-contact situations. Such situations have an intermediate stage of bilingualism in which the dominant language is employed by an increasing number of individuals and characterized by the robust factor, age (Campbell and Muntzel 1989). As more younger generations in a subordinate community shift to the dominant language (O'Shannessy 2011), fewer children learn the minority language, and often those who do so learn it imperfectly, resulting in semi-speakers, people who have learned the language to some degree but are not fully fluent. This is the situation of the gradual shift of a minority language, with a greater frequency of variation, to a majority language (Palosaari and Campbell 2011). The literature on sound change in obsolescing languages has focused on whether the changes are internally or externally motivated which result in either convergence with or divergence from the dominant language (Campbell and Muntzel 1989; Dorian 1993). This distinction has left differences between the categorical phonological shift, which can eliminate phonological distinctions, and gradient phonetic effects, which may minimally impact on the native structure of the language. It is worth nothing that these types of changes may coexist within the same community of minority languages in contact with the dominant language.

Considering the fact that speakers of an obsolescing language are expected to make fewer phonological distinctions, yet maintain distinctions in the endangered language that also exist in the dominant language, and phonological distinctions with a low functional load are to be lost prior to those with a high functional load (Andersen 1982, Campbell and Muntzel 1989, Babel 2009) offers two feasible approaches to the investigation of sound change in the present study. This point of view emphasizes the effect of the phonological structure of the Persian dominant as the causal factor in the loss of oppositions in Kurmanji (external motivation); the markedness view, on the other hand, suggests that the marked nature (unnaturalness due to the difficulty of pronunciation) may contribute to its merger with the unmarked feature. Thus the lack of aspirated/unaspirated distinctions and the phonotactic constraints of the consonant clusters in the onset of syllable structure in dominant Persian and the tendency to reduce markedness conceivably could have worked in concert, jointly leading to the loss in Kurmanji and through convergence with Persian. These findings support the assertion made in Campbell and Muntzel (1989) in which the authors predict that the variability in production increases as a function of the level of language obsolescence.

1.1. Transfer, approximation, and expantion in phonological merger

Tradgill and Foxcroft (1978) introduce the concepts of transfer and approximation in their analysis of vowel mergers in East Anglia. In the case of transfer, two phonemes merge via the first phoneme, categorically changing to the second phoneme in more and more words containing the former phoneme; in this case, the merger is accomplished by the unidirectional transfer of one phoneme to another in a process that "involves … a form of lexical diffusion" (ibid.: 73), which is "not consistent with a result that shows an intermediate phonetic form" (Labov 1994: 321). In the case of approximation, however two phonemes merge as their individual phonetic spaces approach (i.e. approximant) each other; here both phonemes typically shift, resulting in a merged category with a phonetic space intermediate between the original phonemes. In addition to these two merger types, Labov (1994: 321-323) adds a third type, expansion, in which the phonetic

space of the merged category ends up spanning the phonetic spaces of both original categories. These categories of merger figure prominently in an acoustic and articulatory study of Northern Paiute (Uto-Aztecan, Western Numic) carried out by Babel (2008), who documents two kinds of sound change in a language. First, a three-way laryngeal contrast is maintained in each of three generations of speakers; however, the phonetic realization of this contrast differs across generations, and in the youngest generation there is increased subphonemic variation. Second, the place of articulation of the language's sibilant shifts from a palatalized post-alveolar to a plain alveolar /s/, while a more palatalized allophone is replaced by the palate-alveolar /ʃ/ in the youngest generation. Based upon these results, Babel hypothesized that contrasts based on timing relationships (e.g. laryngeal contrasts) are more likely to undergo sound change via approximation, while contrasts that are more categorical in nature (e.g. consonantal place contrasts) are more likely to undergo sound change via transfer. Labov (1994: 321) additionally asserts that transfer happens more often when "one form has acquired a social stigma or prestige"; the less prestigious from transferring to the more prestigious form used in the dominant standard language.

Chang (2007:601) cited from Campbell and Muntzel (1989) in which they review two other types of phonological change that can occur in obsolescing languages. First, "variability may develop in the application of phonological rules: rules that used to be obligatory may apply optionally, show substitutions, or simply be lost". The case of optional rule application usually results in free variation between forms that have resulted from the rule and those that have escaped it. Second, "phonological rules may be undergeneralized or overgeneralized."

This chapter argues that sound change in the Kurmanji language may manifest substitution (Transfer) or approximation/expansion of phonological categories resulting in convergence with or divergence from the dominant language, in the targeted moribund language. Social factors influencing mechanisms and outcomes include the reason for the language contact, the dominance of the group speakers, the amount of social and cultural pressure groups exert on each other, and the relative instrumental value of the languages.

Instrumental value is a measure of how useful the language is for the economic and social advancement of the speaker (O'Shannessy, 2011).

Increasing convergence across the phonetics/sociolinguistics divide has not only led to the development of new integrated theoretical positions (Docherty and Foulkes, 2006; Pierrehumbert and Clopper 2010), but has also opened up a wider range of explanatory accounts for observed patterns of variation, with the emphasis on ensuring that variation which is attributed to social factors might not be a secondary consequence of some other phonetic factor (and vice versa).

In this chapter following recent investigations of obsolescing languages such as Babel (2009), I present a study of phonetic and phonological changes in the target language, "Kurmanji" based upon recordings of two generations of speakers. This chapter focuses on the realization of a phonological sound change to investigate whether this change is a gradual shift or a categorical change. The investigation of sound change in Kurmanji is consonant cluster reduction, namely the deletion of /w/ in the cluster /xw-/, which the younger generations tend to simplify. Examples representing the cluster onsets are the reflexive pronoun "xwe". This case study evaluates the effects of a dominant Persian on the complex onset in the phonological system of bilingual Kurmanji-Persian speakers. Fricative + glide sequences whose structural status as a complex onset is debated in the Kurmanji phonology literature, is patterned differently from Persian phonology in which the consonant cluster cannot occur in the onset. The syllable structure of Persian is CV(C)(C), while the syllable structure in Kurmanji is (C)CV(C)(C). Specific findings are viewed in light of relative markedness of consonant clusters in syllable-initial position in terms of their relationship to singletons which comprise a simple onset, meaning that only a single segment occupies the prevocalic position and is considered unmarked as compared to those more complex consonant clusters.

It is clear that categorical changes, loss of allophones, and sub-phonemic variation are all characteristics of sound change in obsolescing languages. The extent to which sound changes have occurred in the Kurmanji language of Khorasan is considered through instrumental phonetic investigation in this chapter. Unlike the findings from

voicing distinctions in Chapter 3, which suggest the approximation of the gestures for the long lag VOTs, the formant analysis of the vowel following the consonant cluster displayed no trace of /w/ in younger generation of Kurmanji speakers. This result shows the reduction of /xw-/ to /x-/ in the onset of Kurmanji syllables and indicates the categorical shift via "Transfer (Labov 1994; Babel 2008)" to the Persian category in which consonant clusters in the onset are not employed.

Recent studies of phonological variation in Iranian languages, especially the Kurdish varieties, have not focused on consonant cluster variation regarding the change based upon social and structural factors, like what was reported for other minority languages. Although there are reports (e.g. Zahedi, Alinezhad, and Rezai 2012) of Sanandaji/Erdelani Kurdish (Western Iranian group) investigating the Sonority Sequencing Principle, they found that, of three kinds of consonant clusters existing in all languages, only core clusters-clusters that conform to the sonority sequencing principle (SSP)-are found in Sanandaji, and therefore the arrangement and combination of segments to make syllables in this dialect of Kurdish is absolutely governed by the SSP. There are no comparative accounts for consonant clusters in Iranian minority languages vs. the dominant languages considering the social and structural factors. Within this study, analysis of a range of other variables has brought to light a number of parameters where there are significant age-related differences within a particular location, and has also pointed to different levels of permeability from the dominant language attributable at least in part to prevailing language ideologies. Given this context, the present study investigates the patterning of initial consonant clusters across the two generations in Kurmanji concerned with the aim of examining the complex interaction between phonetic and social factors in the realization of a phonological variable. More specifically, this chapter addresses the following questions:

1- Is there a systematic change in the status of phonological rules for the initial consonant cluster values in two generations of Kurmanji language?
2- Do intergenerational factors and the dominant language play a role in characterizing the change in phonological rules?

3- What is the degree of change in the observed variation between the two generations? Is it gradual shifts or categorical changes?
4- Can we support the position that the phonological change results in either convergence with or divergent from the dominant language?

2. Structural complexity of consonant clusters: A phonologist's view

In spite of the fact that almost everybody can intuitively identify syllables and knows how many syllables a word has, no one can give a definition of the syllable. It does not have a unified and accepted definition among linguists either (Ladefoged 2006:226). This is due to the fact that the syllable has different structures in different languages; it is not a sound/phone but, an essential abstract unit in phonology that has no clear and unified phonetic counterpart, (Kenstowicz 1994:250); and "…the syllable is primarily defined over sequences of discrete phonological segments rather than over phonetic primes as such. At this level of abstraction, few constructs have direct phonetic definitions" (Clements 2005). Different theories have been presented to define the syllable and account for its features: The pulse theory (put forward by the psychologist R. H. Stetson) which studies the syllable from a phonetic point of view, defines it based on chest pulses, so that the number of syllables in this theory is the same as the number of chest pulses. In auditory/perceptual theories the syllable is defined based on sounds sonority feature. Here, the vowels, which are the most sonorous language sounds, always occupy the nucleus or peak of the syllable so, the number of syllables is supposed to be equal with the number of vowels. In phonological theories the focus is on the ways vowels (V) and consonants (C) are combined to form sound sequences (Crystal 2008:442). Therefore, language sounds are considered to be building blocks of the syllable structure and are divided into two main groups: The first group which includes vowels, nasals, and liquids are all [+sonorant] and can occupy the peak of the syllable; the second group is made up of all the other sounds of language which have the common feature of [-sonorant] and can only come in the margins of the syllable (Chomsky &

Halle 1968:354-355). In this way, vowels and consonants make up the structure of the syllable. However, the combination of vowels and consonants to form syllables does not take place haphazardly, but follows strict orders dictated by syllable structure of languages, and units formed in this way have their own internal structure and distribution, and are governed by their own rules. The syllable structure (as shown in Figure 4.1 below) includes two parts: The onset (O) and the rhyme or rime (R) which, in its turn, is divided into the nucleus (N) and the coda (C). The nucleus is generally the domain of vowels, but, in some cases it can be occupied by sonorant consonants, which are /l/, /m/,/n/, and /r/ in English (MacMahon 2002:104-105).

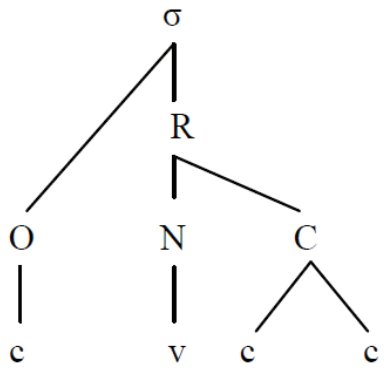


Figure 4.1. Syllable Structure

In addition to the number of segments that languages use, it is also important to consider the ways that the segments are allowed to combine with each other in making longer structures, such as words and syllables. Some languages allow very free combination of segments, while in others the combinations are strongly restricted. In this chapter firstly the complexity of sequencing of segments within syllables will be discussed as a means of examining one important aspect of how the combination of individual sounds is governed across the sampled set of languages.

The syllable is a well-recognized unit in linguistic analysis which explains quite well the number of rhythmic units that will be perceived in a word or longer utterance.

This number is usually equal to the number of vowels in the utterance. Although it is usually easy to get agreement on the number of syllables present in a word, intuitions

sometimes differ over where the boundaries between one syllable and another should be placed. Despite such hesitation, the syllable has proven to be a very useful concept in discussing the general rules for distribution of sounds in languages. Where listeners differ in syllabifying particular words, it is generally the case that both possible syllabifications can be shown to be permitted ones since unambiguous cases of each type can be found. For example, an English word such as *pastry* might be syllabified by different speakers as *past.ry* or as *pas.try* (where the dot represents a division between syllables). Since both paste and tree are perfectly acceptable monosyllabic words of English, either division will agree with a broader rule concerning possible syllables of English. The broadest rules of this kind for any given language describe what is called the canonical syllable pattern of the language. This is the pattern which essentially characterizes how many consonants may occur before the vowel in a syllable, and how many after the vowel. The one kind of syllable which seems to occur in every language is CV, that is, a syllable consisting of just one consonant preceding a vowel. In a relatively small number of languages this is the only type of syllable permitted. It is more frequent to find languages in which it is permitted not to have an initial consonant, as for example in Fijian, Igbo (Niger-Congo; Nigeria), and Yareba (Yareban; Papua New Guinea) (Maddieson 2008 (WALS)). For these languages the canonical syllable can be represented as (C)V, the parentheses indicating that an initial consonant is an optional element. If a language only allows syllables which fit this template, the language will be said to have simple syllable structure.

The classification of languages into three categories of syllabic complexity, simple, moderate and complex (Maddieson 2008 (WALS[1])), naturally overlooks many other questions of segment distribution (for example, whether the syllables at the beginnings and ends of words have the same or different restrictions from those which are internal to words), and has to gloss over some important differences with respect to how rarely or frequently the more complex syllable types occur in a given language. In reaching decisions regarding how to classify a given language, certain common-sense flexibility

[1] http://wals.info

has been employed. For example, if some kinds of consonant sequences have only recently been introduced into a language as a result of borrowing international words (such as sport or music) the language will be classed on the basis of what occurs in more established vocabulary.

This section attempts a definition of consonant clusters, consonant cluster complexity, and cluster complexity reduction in a phonological perspective. Vennemann (2012:11) claims that "a metrical (and thus: general) definition of consonant cluster complexity is not possible, a relative and structure-dependent concept is proposed: Only clusters within the scope of one and the same preference law can be compared, namely evaluated as the more complex the less preferred they are in terms of that preference law." This concept, as well as ways in which cluster complexity is reduced, are illustrated with examples from various languages.

2.1. What is a consonant cluster?

A slightly more elaborate syllable structure would add another consonant, either in the final position of the syllable or at its beginning, giving the structures CVC and CCV; these are both modest expansions of the simple CV syllable type. But it is worthwhile to make a distinction between two types of two-consonant strings. In a very large number of languages, although two consonants are allowed in the onset position of a syllable, there are strict limits on what kinds of combinations are permitted. The second of two consonants is commonly limited to being one of a small set belonging to either the class of "liquids" or the class of "glides". The liquids are the sounds commonly represented by the letters r and l, while glides are vowel-like consonants such as those at the beginning of the English words wet and yet. Liquids and glides are produced with a configuration of the speech organs which permits a relatively unobstructed flow of air out of the mouth. Languages which permit a single consonant after the vowel and/or allow two consonants to occur before the vowel, but obey a limitation to only the common two-consonant patterns described above, are counted as having moderately complex syllable structure. An example is Darai (Indo-Aryan; Nepal). Here the most elaborate syllable permitted is

CCVC, as in /bwak/ '(his) father', but the only possible second consonant in a sequence of two is /w/.

Languages which permit freer combinations of two consonants in the position before a vowel, or which allow three or more consonants in this onset position, and/or two or more consonants in the position after the vowel, are classified as having complex syllable structure. An obvious example of complex structure is English, whose canonical syllable pattern is often cited as (C)(C)(C)V(C)(C)(C)(C). The full expansion of the pattern only occurs in a few words such as strengths, when pronounced /stɹɛŋkθs/, but it is relatively easy to find syllables beginning with three consonants or ending with four, as in split and texts (/tɛksts/).

In any event, a cluster consists of discrete elements, a consonant cluster of discrete consonantal elements. In traditional phonetics one learns that phonetic objects are continua. Hence a consonant cluster as a phonetic object would have to be a continuum, and that is what a cluster by definition is not. Hoole (cf. Vennemann 2012:12) stated that modern phonetics can show that a degree of segmentation already occurs at the articulatory level, rather than only on the mental articulatory retina (for which cf. Tillman/Mansell 1980), and that within the so-called gestural framework (Browman and Goldstein 1986, 1989, 1992), "gestures whose coordination is part of a word's lexical representation bear a close relationship to those conglomerates of gestures that constitute what is traditionally considered to be a 'segment'" (Byrd 1996: 160).

However that may be, phonologists have no problem defining a consonant cluster, namely indeed as a set of consonants understood as discrete objects, but more precisely as an uninterrupted sequence of two or more consonants within some well-defined unit of language, such as a syllable, word, or phrase. And if phonologists do have a problem it is because they do not know for sure what a consonant is, an uncertainty which may also hold for phoneticians. For example, is the second speech sound in *twist*, *twinkle*, *twine*, *twenty*, *twaddle*, etc. and in *quick*, *quest*, *quiet*, *quota*, etc. a consonant or vowel? If it is a consonant, then the words *twist* and *quick* begin with a consonant cluster. If the second speech-sound is just the vowel /u/ in a syllable margin, namely in a complex syllable

head, then those words do not begin with a consonant cluster, but rather with a sequence of consonant and vowel within a syllable head. Perhaps that is actually what phonologists mean when speaking of consonant clusters: “an uninterrupted sequence of marginal speech sounds, i.e. a sequence of speech sounds not interrupted by a syllable nucleus (nor, of course by a pause)” (Vennemann 2012). Presenting the particular scale in (1) from Vennemann (1988:9), Vennemann (2012) states that speech sounds of any language can be arranged hierarchically on scales of increasing consnantality, or decreasing sonority, without any point, as in (1).

(1) Consonantal Strength Scale: No division between vowels and consonants increasing Consonantal Strength (Vennemann 2012:12).

↑ Voiceless plosives
Voiced plosives
Voiceless fricatives
Voiced fricatives
Nasals
Lateral liquids (l sounds)
Central liquids (r sounds)
(Glides) (I add the glide to reach the finest scale of sonority sequencing)
High vowels
Mid vowels
Low vowels

Some other phonologists use finer scales, for example scales which hierarchize obstruents and nasals by place of articulation, and vowels on the frontness parameter. Conversely there are less fine-graded scales, such as scales lumping all obstruents or all vowels together or not distinguishing lateral and central liquids in terms of strength. Thus one often sees the simple scale V L N F P (vowels liquids nasals fricatives plosives). The above scale may be the most fine-graded that most linguists can agree on. When finer distinctions are made, language-specific differences begin to play a role, and linguists will begin to differ.

Turning now to the question of clustering, Vennemann (2012) presents the following definitions, (2) to (7).

(2) A cluster is an uninterrupted sequence of cardinality greater than one.

(3) A consonant cluster is a cluster of marginal speech sounds (i.e. a cluster of speech sounds not interrupted by a nuclear speech sound).

(4) A head cluster is a consonant cluster entirely within a syllable head.

(5) A coda cluster is a consonant cluster entirely within a syllable coda.

(6) An intersyllabic cluster is a consonant cluster containing both coda and head speech sounds.

(7) A contact cluster is an intersyllabic cluster of cardinality two.

2.2. What is consonant cluster complexity?

Phonologists have gathered a lot of information on consonant clusters and their structural complexity, and have formulated a number of generalizations. These are well-founded, inasmuch as they find support in the observation of numerous language systems, in which always the less complex structures are favored over the more complex, in the sense that the occurrence of complex structures almost always implies the occurrence of the less complex ones on a given structural parameter. They also find support in the observation of language change, in which "always the more complex structures are eliminated before less complex ones on the same parameters of complexity (cf. Vennemann 1989)."

For example, if a language has consonant clusters of three, it also has consonant clusters of two, but not conversely. Or more generally, cf. (Vennemann 2012:14):

(8) If a language has consonant clusters of cardinality n (n>2), it also has consonant clusters of cardinality n-1.

Changes reducing the clusters can be found in many languages, and for some languages the maximal cardinality of certain clusters has decreased in historical times, for

example that of head clusters in Korean and Pali. In the early history of English there have been sporadic attempts at reducing tri-consonantal word-initial syllable heads, for example in the words speak (German *sprechen*) and shut (German *schließen*), cf. (Vennemann 2000). But these changes have not become general, as shown by *spring*, *split, strand* etc.

2.3. How is consonant cluster complexity reduced?

There are numerous mechanisms which reduce the complexity of consonant clusters, thereby eliminating clusters from their positions on the scale. In early English, initial clusters of velar plosives k, g plus the nasal n were eliminated by deleting the plosive. Greek word-initial clusters of two plosives were eliminated by deleting the plosive. Clearly in a manner of speaking we understand why and how the complexity of consonant clusters is reduced. Phonologists do because they can interpret consonant cluster changes as improvements on their quality scales; and phoneticians do because they can interpret those changes as articulatory simplifications. We can observe six different repair processes in many languages with consonant clusters: epenthesis, C1-deletion, C2-deletion, CV metathesis, syncope and substitution.

2.3.1. Epenthesis

Epenthesis appears to be the most frequent adaption process in languages (Paradis and LaCharité 1997). When vowel epenthesis is used to break up a consonant cluster, there is often more than one location where the vowel could be placed to produce a phonotactically acceptable output. For example “if a language has open syllable structure {CV, V}, hence disallowing CC clusters at the beginning of a word, an initial CCV could be broken up by putting a vowel before the consonants (VC.CV) - prosthesis - or between the consonants (CV.CV) - anaptyxis” (Vàrnai 2012:135). In a medial CCC cluster, the vowel could occur before the second or third consonant. The choice of epenthesis location is language specific. Epenthesis affects clusters in all three positions, most often

in complex codas in final position, and complex onsets in word-initial position, but it can occur at different locations in the word in the same language.

- CCVCC >CVCCVC (In Persian, the minimum syllable structure is CV, thus to break up the initial CCV, a CV syllable structure is needed to be put before the onset cluster and C in this CV is always the glottal stop /ʔ/).

  stɑjl > ʔestil ‘style’ (Persian (loanword from English)

- saxtman > saxteman ‘monument’ (Persian, (Kambuziya 2007))

2.3.2. C_1-deletion

In general vowel epenthesis seems to be a heavily preferred repair type in loanword adaption. Uffmann (2007) surveys case studies of loanword adaption and he concludes that consonant deletion is a marginal phenomenon, compared to epenthesis. Adding extra segments is less undesirable than deleting segments from the word (Paradis and LaCharité 1997). For example C_1-deletion affects only Russian tautosyllabic clusters in the onset. The C_1-deletion in Persian occurs in heterosyllabic clusters in the syllable boundary.

$CVC_1C_2VC > CV:C_2VC$

taʔsir > ta:sir ‘influence’

maʔkus > ma:kus ‘inverted’

The glottal stop deleted and the vowel preceding it lengthened according to the compensatory lengthening rule (Persian, (Kambuziya 2007)).

2.3.3. C_2-deletion

This is a very interesting repair process. In general, when truncation occurs it eliminates the first consonant of the cluster. Vàrnai (2012:138) states examples from the language ‘Selkup’ in which, C_2-deletion is active affecting two intersyllabic clusters and one onset cluster. “The Russian complex sibilant + plosive onset cluster is resolved by two types of truncation in Selkup”:

Zdarovat^{j}-s^{j}a > sarowatti-qo ‘to welcome’

Kukla > kuka ‘puppet’

In this chapter, I will discuss C_2-deletion on initial consonant clusters in Kurmanji affected by the dominant Persian in which the initial consonant cluster /xw-/ in reflexive pronoun ‘xwa’ reduces to the single cluster /x-/.

2.3.4. CV-metathesis

This adaption strategy primarily affects initial onset clusters; it is not a common strategy, and its goal is to restructure the complex onset and to shift the cluster to the syllable boundary:

CCVCV > CVCCV platok > poltok ‘kercheif’ (Enets language Vàrnai (2012))

CVCC > CVCVC Gofl > Golof ‘lock’ (Persian)

CVCCCVCV > CVCCVCCV kastrul^{j}a > kosturl^{j}a ‘pot’ (Selkup language (Vàrnai 2012))

2.3.5. Syncope

In phonology, syncope is the loss of one or more sounds from the interior of a word, especially the loss of an unstressed vowel. It is found both in synchronic analysis of languages and diachronics. Presumably the aim of this strategy is to make a trisyllabic word bisyllabic, because bisyllabic structures are the more frequent ones.

bumaga > bomga ‘paper’ (Enets language (Vàrnai 2012))

harecat > harcat ‘movement’ (Persian, (Kambuziya 2007))

barecat > barcat ‘bless’ (Persian, (Kambuziya 2007))

2.4. Repair strategies and cluster types

The choice of epenthesis locations is language specific. The placement of the vowel depends on what kind of consonants are in the cluster. Fleischhacker (2001) presents a typological study of epenthesis in initial CC(C) clusters in loanwords in many languages, focusing on the question of whether the vowel precedes the cluster (VCC) or breaks up the cluster (CVC). Generally in a voiceless sibilant + stop cluster, a vowel

tends to be inserted before the cluster while in an obstruent + sonorant cluster, a vowel tends to be inserted into the cluster.

3. Limited consonant clusters in OV languages

It has been pointed out that languages with object-verb order (OV) tend to have simple syllable structure (Lehmann 1973, Gil 1986, Plank 1998). This is the case in some OV languages such as Ijo, Yareba and Warao, whose syllable form is CV (Tokizaki and Kuwana 2012).

3.1. Implicational universals

There have been a number of studies that try to show the correlation between phonology and syntax; Plank (1998) presents an overview of these. Concentrating on the relation between syllable structure and verb-object order, it has been pointed out that languages with object-verb order (OV) tend to have simple syllable structure (Lehmann 1973, Gil 1986, Plank 1998). Tokizaki and Kuwana (2012) cited the list of two correlations with comments by Frans Plank from "The Universals Archive[2] as shown in (9).

(9) a. OV languages tend to have simple syllable structure.
b. IF basic order is OV, THEN syllable structure is simple (tending towards CV).
c. Counterexamples: -
d. Comments: Languages with flexive morphology (which tend to be OV) tend to have the ends of syllables closed, with consonant clusters occurring in this position as freely as in initial position (Lehmann 1973: 61).

This implicational relation is the case in some OV languages, such as Ijo (Niger-Congo), Yereba (Papua New Guinea) and Warao (Venezuela), whose syllable form is CV. The Universals Archive also shows another correlation between word order and syllable structure, as shown in (10).

[2] http://typo.uni-konstanz.de/archive/intro/index.php

(10) a. VO languages tend to have complex syllable structure.

b. IF basic order is VO, THEN syllable structure is complex (permitting initial and final consonant clusters).

c. Counterexamples: Old Egyptian (Afro-Asiatic): VO, only syllable types CV and CVC (F. Kammerzell, p.c; cf. Tokizaki and Kuwana 2012).

The two observations in (9) and (10) predict that there will be considerable differences between SOV and SVO languages with respect to syllable complexity. Gil (1986) tests the correlation between OV/VO order syllable structures with his 170 sample languages. He reports the average number of segments in the syllable structure templates: SOV 4.04 < SVO 4.93. However, this result is not very convincing because the difference between SOV and SVO is less than 0.9 (0.89). Moreover, the number of sample languages is not large enough to claim (9) and (10) as universals across languages; it is necessary, therefore, to test the hypothesis with more data.

Tokizaki and Kuwana (2012) tried to show the correlation between OV/VO order using data from the WALS project (Haspelmath et al. 2005) in which they list 2,561 languages, including 359 languages with data on both syllable structure and OV/VO order. Maddieson (2008) in WALS (chapter 12), divides languages into three categories according to their syllable structure: 'simple', 'moderately complex' and 'complex', as shown in (11) (cf. Tokizaki and Kuwana 2012).

(11) a. Simple

CV Hawaiian and Mba (Adamawa-Ubangian, Niger-Congo; Democratic Repubic of Congo)

(C)V Fijian, Igbo (Niger-Congo; Nigeria), and Yareba (Yareban; Papua New Guinea)

b. Moderately complex

CVC

CC_2V C_2 = liquids (r/l) or glides (w/j)

CC_2VC C_2 = w in Darai (Indo-Aryan; Nepal)

c. Complex

(C)(C)(C)V(C)(C)(C)(C) English

Categorizing syllable complexity into three groups is effective in showing typological differences between languages. However, as Plank (2009) points out, the categorization is not fine enough to enable correlations between syllable complexity and other features to be identified. Maddieson (2010) admits the crudity of this three-way distinction of syllable complexity, and proposes a refinement of syllable typology by scoring the complexity of onset, nucleus and coda, as shown in (i)-(iii).

(i) Contribution of Onset:

0 = Maximal onset is single C

1 = Maximal onset is C+liquid, glide (or nasal)

2 = Maximal onset is CC where C2 may be an obstruent

3 = Maximal onset is CCC or longer

(ii) Contribution of Nucleus:

1 = Nucleus is only simple (monomoraic) V

2 = Nucleus may be long vowel or diphthong

(iii) Contribution of Coda:

0 = No codas allowed

1 = Maximal coda is single C

2 = Maximal coda is CC

3 = Maximal coda is CCC

The refined syllable typology has eight steps on a scale (1-8). Maddieson claims that distribution of languages across categories is approximately normal with N = 605 languages. According to this typology, 'simple' languages (maximal syllable CV), Hawaiian and Mba = 1, Japanese = 3 (maximal syllable C_jVVC) and Dutch/English = 8.

4. Clustering of Sonorants (S) and Obstruents (O)

In word initial, bi-consonantal onset clusters there are four logical combinations of obstruents (O) standing for [-sonorant] consonants, and sonorants (S), standing for [+sonorant] consonants. Kreitman (2012) displayed four logical possibilities for combining obstruent (O) and sonorant (S) consonants in an onset cluster are as in (12):

(12) a. OS b. OO c. SS d. SO.

In the obstruent (O) class only consonantal segments specified for [-sonorant] are included; this includes both stops and fricatives. Conversely only segments specified for [+sonorant] are included in the sonorant (S) class. Logically, a language can have any of the clusters in (12), or any combination of them, or none. According to Kreitman (2012), a language that has none of the clusters listed in (12) is, of course, a language that does not allow any consonantal clusters. Given the cluster combinations in (12), she considered fifteen logical possibilities for combining these clusters into groups of one to four cluster types as in (13). In her discussion of the logical possibilities of combining clusters she noted: If a language L has only one of the onset clusters listed in (12), it can, a-priori, be only one of them, as in (13a). If a language has two of the onset clusters in (12), it can, a-priori, be only one of them, as in (13b). If a language has three of the onset clusters in (12), it can have any of the sets listed in (13c). Finally, it is logically possible for a language to have all four onset clusters listed in (12), as in (13d). A language that has no onset clusters constitutes an empty group, { }, which is the sixteenth possible language type and is excluded from this study.

(13)	a. 1 cluster	b. 2 clusters	c. 3 clusters	d. 4 clusters
	{OS}	{OS, OO}	{OS, OO, SS}	{OS, OO, SS, SO}
	{OO}	{OS, SS}	{OS, OO, SO}	
	{SS}	{OS, SO}	{OS, OO, SO}	
	{SO}	{OO, SS}	{OO, SS, SO}	
		{OO, SO}		
		{SS, SO}		

In sum, in (13) Kreitman (2012) listed all the fifteen logically possible language types (exluding the empty group). The question arises, which of the logically possible language types in (13) are occurring language types. The greatest challenge in this typological study was to distinguish between a sequence of two consonants and a cluster. Therefore, a host of criteria were assumed reading the status of a sequence of consonants. The basic criterion for including a language in the survey is whether it allows consonantal clusters word-initially. To be precise, the word initial sequence C_iC_j is taken to be an onset cluster if it does not contain a morpheme boundary or any intervening phonological material as stated in (14):

(14) Onset cluster: Let C_iC_j be a word initial sequence of consonants. The sequence of C_iC_j is an onset *cluster* if:

(i) There is no morpheme boundary between C_i and C_j: (C_i and C_j are tauto-morphemic).
(ii) There is no segment S_i such that $C_iS_iC_j$ (there is no intervening material between C_iC_j).
(iii) C_iC_j are linked to the same syllable node.

It should be noted that all sequences which conform to (14), including sequences of segments which violate the Sonority Sequencing Pirnciple (Selkrik 1984, Clements 1990), constitute regular onset clusters for the purposes of this survey.

4.1. Sonority Sequencing Principle

Sonority has been subject to many studies for more than a century. Despite giving various, different definitions for it, most linguists agree on the important role of sonority in syllable structure (Morelli 2003). Like the syllable, there has been little agreement among linguists on the definition of sonority and, different phoneticians have suggested different parameters to characterize it. Some linguists relate it to audibility, in the sense that more audible sounds are more sonorous (Clements 2005). Selkirk defines it in terms of degree of opening, in the sense that the opener a sound, the more sonorous it is. So vowels, that are the most opening sounds, are the most and stops are the least sonorous ones (Selkirk 1984). MacMahon talks of sonority as a notion that differs sonorants from

obstruents in that, sonorants have “greater carrying power” due to their acoustic features and hence, are more sonorous (MacMahon 2002: 107). Ladefoged equates sonority with acoustic energy, and defines it based on the loudness of a sound “relative to that of other sounds with the same length, stress, and pitch” (Ladefoged 2006: 227). A generalization, known as the Sonority Sequencing Principle/Generalization (SSP), states that in all languages, vowels and consonants that are combined to form syllables, are arranged so that sonority is the highest in the peak of the syllable and decreases as we move away from the peak towards the margins (Clements 1990). However, in many languages the SSP is not absolutely followed and violations of it are attested to; a reason for some to regard the SSP more as a universal tendency than an absolute generalization (Morelli 1999: 23). The Sonority Sequencing Principle states the strong cross-linguistic tendency for syllables to rise in sonority towards the peak and fall in sonority towards the margins. The SSP as formulated in Selkrik (1984) is given in (15). However while (15) constitutes a strong cross-linguistic tendency, it is not equally obeyed by all types of languages, as will be demonstrated in this work:

(15) Sonority Sequencing Principle (SSP)

In any syllable, there is a segment constituting a sonority peak that is preceded and/or followed by a sequence of segments with progressively decreasing sonority values (Selkrik 1984: 116).

The structure of onsets and their role within the syllable has long been debated in the literature (Kahn 1976, Selkrik 1982, Clements and Keyser 1983, Hyman 1985, McCarthy and Prince 1986, Zec 1988, Ito 1989, Clements 1990, among others). The question of whether sequences which do not conform to SSP can form a real cluster in the phonological sense is highly controversial. Solutions in the form of sesqui-syllables, head-less syllables, extrametrical material and appendices, amongst others, have been proposed in the literature to account for deviant and non-compliant onsets (Steriade 1982, Everett and Everett 1984, Thomas 1992, Cho and King 2003, Vaux 2004). A language was excluded from the survey if its clusters did not conform to one of the conditions

listed in (14). On the basis of these assumptions, of the fifteen logically possible language types in (13), Kreitman (2012) posited that only four language types emerge, as in (16):

(16) Type 1 {OS}
Type 2 {OS, OO}
Type 3 {OS, OO, SS}
Type 4 {OS, OO, SS, SO}

Evident from (16), Kreitman (2012) claimed that there are the implicational relations between the various clusters. She noted that if a language allows only one type of cluster it is OS; If a language has OO clusters, it will also allow OS clusters; If a language has an SS cluster, it will also have OO and OS clusters. And lastly, if a language has SO clusters it will allow all other clusters: SS, OO and OS.

In sum, evident from (16) are implicational relations captured in (17). The implicational relations in (17) are all unidirectional and without exceptions in the languages of the survey by Kreitman (2012). She singled out crucial asymmetries evident in the implicational relations in (28).

(17) SO ⟹ SS ⟹ OO ⟹ OS

Kreitman (2012:39) described an asymmetry between the right and left edges of the implicational relations: "The presence of SO clusters implies the presence of all other clusters while OS clusters are implied by all other clusters. This asymmetry is expected given that SO is of falling sonority, that is, violates the SSP, while OS has a rise in sonority, i.e. conforms to the SSP." Based on the SSP it is expected that clusters with rising sonority to occur more frequently than clusters with reversed sonority. It is important to note that there is an increase in sonority from an obstruent segment ([-sonorant]) to a ([+sonorant]). Similarly, a decrease in sonority denotes a shift from a positive value of the feature [sonorant] to a negative one, as in SO ([+sonorant] [-sonorant]) sequences.

There is an asymmetry between OO and SS clusters. Kreitman (2012:40) described this asymmetry by asking this question: "why is it that SS implies OO but

neither OO implies SS nor OO and SS symmetrically imply each other (*OO SS)? There are several reasons which she suggested that make OO clusters less marked than SS clusters. One possible reason is the acoustic salience of obstruents as opposed to sonorants. Obstruents are perceptually more salient than sonorants, therefore their combinations are also more salient." Ohala (1983:193) notes: "Obstruents, especially those that involve a transient burst due to the rapid spectral changes and thus are able to carry more information and make more distinctive sounds than non-obstruents." Thus, obstruents, due to their acoustic attributes, when released, carry more information, especially in onset (or word initial) position and are therefore easier to distinguish from non-obstruents. It is expected that their combinations are also more acoustically salient than combinations of sonorants and are therefore perceptually more advantageous.

This might also explain another cross-linguistic observation made by Lindblom and Maddieson (1988), which is also the second reason OO clusters may be less marked than SS clusters. According to Lindblom and Maddieson (1988), phonemic inventories of languages tend to have a distribution of roughly 70% obstruents and 30% sonorants. This results in greater clustering possibilities for obstruents than sonorants. Therefore, the greater markedness of SS clusters stems simply from the mathematical reality that there tend to be fewer sonorants than obstruents in cross-linguistic phonemic inventories.

Finally, Kreitman (2008) presents the sub-typology of both OO clusters, based on Morelli (1999), as well as SS clusters. She finds that while markedness in the typology of OO clusters is based on manner of articulation, markedness in SS clusters is a combination of both manner and place of articulation. In SS cluster differences in place become crucial to reinforce their perceptual salience. For obstruents, however, manner of articulation alone is sufficient to distinguish between possible members of a cluster. The traditional layer of complication in the internal markedness of SS clusters may account for the fact that they are more marked than OO clusters.

On the basis of these assumptions, and based upon the distributional data regarding each cluster type, Kreitman (2012) posited that if a language allows a consonantal cluster word initially it will allow an OS cluster.

To summarize, following Clements (2005), it is worth noting that because of this lack of a fixed, physical basis for characterizing sonority in language-independent terms, it has not been possible to explain the nearly identical nature of sonority constraints across languages. However, most phoneticians and phonologists agree on a universal sonority scale in which low vowels are the most sonorous segments, followed in decreasing sonority by mid vowels, high vowels, glides, liquids, nasal stops, fricatives, and oral stops (Clements 1990; Butt 1992; Belvins 1995). In this paper, I adopt the universal sonority scale as represented in (18).

(18) Universal Sonority Scale

stops > fricatives > nasals > liquids > glides > vowels

4.2. Predictions about language type shifts

Historical changes in a language's cluster inventory can cause a language to shift types. For example, a language which does not allow clusters at one stage, but allow them at another stage, is said to shift types. Clusters may become part of the grammar in several ways: borrowings, morphological or phonological processes such as syncope as also mention in section 2.3. According to Kreitman's (2012) assumptions, predictions regarding language type shifts follow from the implicational relations stated in (16). A language L1 of type 1, can change membership and become a member of another type, by changing the inventory of clusters allowed by the language's grammar. It follows from (16) that if a language has no clusters then the first cluster type it will achieve is OS. Thus a language with no clusters can shift to become a Type 1 language, i.e. a language with OS clusters. Example of the language that shifted types is Populuca (Elson 1947). The language disallowed consonantal clusters word initially at an earlier point in their history, and due to borrowing (from Danish and Spanish respectively), have shifted to become type 1 languages (Kreitman 2012); both now allow OS clusters. A language may also gain clusters through a process of vowel syncope. For example, a vowel may be consistently deleted in the first syllable of every word. That could result in a language

gaining all types of clusters at once and becoming a type 4 language. However, a language cannot gain only {OO} or only {SS} clusters as languages with only {OO} or {SS} clusters are not empirically attested to and are therefore not part of the typology.

It is also possible for a language to lose clusters. Once again, it is predicted that if a language loses one cluster type, it will lose the cluster type which implies all other clusters. Thus, a language type 4, which allows reversed sonority clusters, those that imply all other clusters, may disallow such clusters and shift to become a Type 3 language. The prediction is that no matter what stage the language is in, if it gains or loses clusters, it must become a language type which is predicted by the typology. A language will never gain only OO and SS clusters without having OS clusters as well because the set *{OO, SS} cannot belong to an occurring language type (Kreitman 2012).

4.3. Multiple articulatory gestures

Most consonantal segments can be described by specifying a single oral articulatory gesture, together with its accompanying laryngeal and vocalic gestures. But there are a considerable number of sound types in which more than one articulatory gesture is employed. In the traditional phonetic literature (Abercrombie 1967), a distinction is made between segments with double articulations and segments with secondary articulations. Ladefoged and Maddieson (1996) illustrated the basis of this distinction on the establishment of a scale of stricture, consisting of three degrees: closure, narrow approximation (such as to produce friction), and open approximation (as in an approximant or vowel). Doubly-articulated segments are those which have two simultaneous movements of the same degree of stricture, such as two oral closures or two open approximations. When two co-occurring articulations have different degrees of stricture, the one with the greater stricture is labeled primary and the lesser one is labeled secondary. This traditional terminology allows for doubly-articulated fricatives, and for a fricative to be the secondary articulation accompanying a stop (Ladefoged and Maddieson 1996).

4.3.1. Secondary articulations

The standard phonetic definition of a secondary articulation is that it is an articulation of a lesser degree of stricture accompanying a primary articulation of a higher degree. This definition allows for the possibility of a secondary fricative articulation combined with a primary stop articulation. Ladefoged and Maddieson (1996) suggested that, from a phonetic point of view, secondary articulations are always approximant-like in nature and do not include fricatives superimposed on stops.

From the aerodynamic and acoustic points of view they assumed that no friction can be generated or be audible during an actual stop closure. "Naturally, when the articulatory requirements for a stop-fricative sequence do not entail conflicting positions for the same articulator, coarticulatory overlap is to be expected." It therefore follows, given a three-way partition of degree of stricture, that only the combinations of closure +open approximation, and close approximation (friction) + open approximation remain as ways of combining a primary and a secondary articulation (Ladefoged and Maddieson 1996). In other words, secondary articulations will always be approximant or vowel-like in their degree of stricture.

There are several different types of secondary articulations. Articulatory gestures involving closure or close approximation can be accompanied by less extreme gestures involving raising the tongue body towards the front or back of the palate or by reacting the root of the tongue, whenever these articulators are not pre-empted for the primary articulation. None of these however, is as common as labialization, a secondary articulation involving the lips. Since it is most common, and the case study of this chapter is the consonant cluster /xwa/ in which secondary articulation is labialization incorporating by the approximant /w/, labialization will be discussed here.

4.3.1.1. Labialization

The addition of a lip rounding gesture is referred to as labialization. It may occur even when the primary articulation is made at the lips. In the great majority of cases

where lip rounding is employed as a secondary articulation, there is also an accompanying raising of the back of the tongue, i.e. a velarization gesture. This is parallel to, and functionally related to, the familiar prevalence of lip rounding paired with backness in vowels. This double secondary articulation type is sometimes called labiovelarization, but Ladefoged and Maddieson (1996) used the term labialization to refer to this complex and propose the term "simple labialization" to describe instances where lip rounding alone needs to be distinguished.

Labialization is the most widely found secondary consonantal articulation, both with respect to the number of different types of segments with which it co-occurs, and the number of languages in which it is found. It is especially common with velar obstruent and, relative to their frequency, with uvulars. Many languages, including such varied ones as Amharic, Wantoat, Gaurani and Kurmanji (the target language in this study) permit labialization only of such back consonants.

In most languages a stronger acoustic effect of the lip action is seen at the release of the primary stricture of a labialized consonant than is seen at the onset of this stricture. Ladefoged and Maddieson (1996) claimed that this stricture arises because of an asymmetry in the timing between the primary and secondary articulation that is not unlike that seen in most labial-velar stops. Thus they said that labialization is typically concentrated on the release phase of the primary articulation that it accompanies. This observation has both phonetic and phonological significance. Many more languages have a restriction between the presence of labialization and the voice of the following vowel, than between its presence and the choice of preceding vowel, and in many languages with labialized consonants the set of syllable-final consonants, if any, does not include labialized ones (Ladefoged and Maddieson 1996).

Ladefoged and Maddiesson (1996) provided an explanation for formant transitions on labialized consonants. They claimed that labial consonants are accompanied by a low second formant transition in adjoining vowels. When they are labialized the second formant is even lower. In accord with their observation that the stronger effect of labialization is seen at the release of the consonant, the lowest formant values are seen

after the release of a labialized consonant. It can also be seen that the formants of the vowel are less affected by a preceding labialized consonant than they are by a following one.

These effects on the vowel show a further interesting asymmetry. When formants are measured in the center of the vowels, both F1 and F2 are significantly lower after an initial labialized consonant than after a plain bilabial. Before a final labialized consonant, F1 is significantly lower, but F2 is not. On the basis of this assumption Ladefoged and Maddieson's (1996) interpretation of this observation is that the two component gestures involved in the secondary articulation of labialization, lip rounding and tongue back raising, have somewhat different timing in relation to the primary articulation, with the tongue backing starting earlier. Tongue raising can be expected primarily to affect F1 (compare the raising of vowels before velars that occurs in some dialects of English), whereas rounding of the lips can be expected to lower all formants in most vowels (Ladefoged and Maddieson 1996).

5. Relative markedness in consonant clusters

Consonant clusters were reduced to singletons, following the cross-linguistic tendency to preserve the obstruent over the sonorant (Ruke-Dravina 1990, Chin 1996, Lleo´ & Prinz 1996, Ohala 1996, Barlow 1997a, Fikkert 1998, Ohala 1998, 1999, Barlow, 2001b, Goldstein & Cintro´n 2001, Pater & Barlow 2003, Barlow 2003). It has been noted that unmarked structures are acquired earlier than marked structures (Jakobson 1969; Smolensky 1996). This has also been found to be the case with syllable structure. Dutch children start producing CV and CVC syllables before CVCC and CCVC syllables (Barlow 2005). When learners are faced with the task of learning a word, they need to make reference to their phonological grammar, which informs them about whether the form violates or satisfies markedness constraints. When a word of a simple CVC structure is acquired, markedness constraints will hardly be violated (Smolensky 1996). The more complex a structure, the more relevant markedness constraints will be for the processing system. The reference to the phonological grammar when acquiring a word

should furthermore have an effect on the influence of probabilistic phonotactics. CV and VC structures are subject to weaker phonotactic restrictions as compared to consonant clusters in syllable margins, which, being part of single syllable constituents (onsets and codas), are subject to stronger co-occurrence constraints (Selkrik 1982).

Most recently, the relative markedness of consonant clusters has been evaluated in terms of their relationship to singletons and other types of clusters. The markedness relationship between consonant clusters and singletons is attributed to structural complexity. In syllable initial position, a singleton comprises a simple onset (Figure 4.2a), meaning that only a single segment occupies the pre-nuclear (prevocalic) position. Because of its relative simplicity, the structure in Figure 4.2a is considered unmarked as compared to those more complex consonant clusters in Figure 4.2b or Figure 4.2c, which represent complex onsets or branching structure within the constituent that precedes the nucleus (vowel) of a syllable.

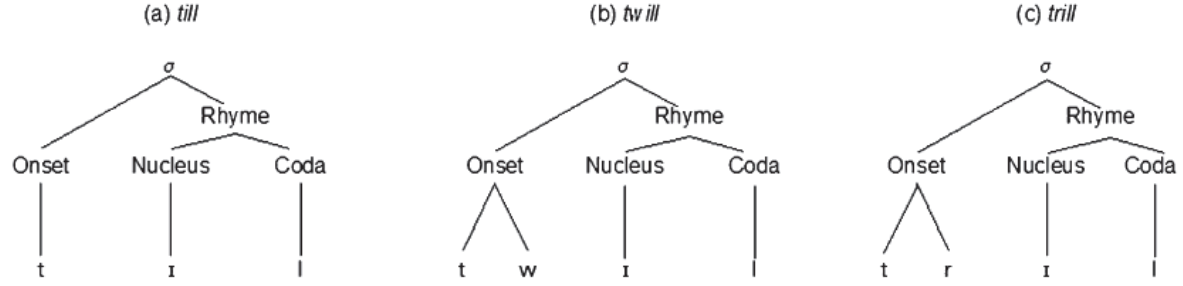


Figure 4.2. Representation of syllable structure for the words (a) till, (b) twill, (c) trill

The markedness relationship between different types of clusters (complex onsets) is characterized in Eckman (1977, 1985), Broselow & Finer (1991), Eckman, & Iverson (1993), Archibald (1998) and Barlow (2005) in terms of featural, rather than structural, complexity. That is, a structure that has an onset that includes a more complex feature specification is considered marked compared to the same structure that includes a less complex feature specification in its onset. For example, training on marked fricative+liquid clusters has been shown to generalize to unmarked stop+liquid clusters (Elbert et al. 1984), since fricatives are marked relative to stops. Similarly, training on

consonant+liquid clusters (as in Figure 3c) generalizes to less-marked consonant+glide clusters (as in Figure 3b) (Gierut 1999), since liquids are marked relative to glides.

6. Kurmanji vs. Persian consonant clusters

No treatment of the causes of linguistic change could be complete without a consideration of the effect of one system on another. Extensive treatments of the effects of dialect contact on language change are available in Trudgill (1986), Chambers (1995) and Williams and Kerswill (1999). More recent efforts to explain linguistic change depend upon more abstract characteristics of rule systems. King (1969) proposed to account for all linguistic changes as forms of rule simplification, though he retracted this argument in favor of a multivariate approach that takes social factors into account. Kiparsky (1971, 1982) argued that linguistic change tends to favor feeding relations of rules, maximizing their application, and that change also tends to minimize opacity and maximize transparency. Labov (1994) argued that the most characteristic sound change is a change in the phonetic realization of a phoneme at a low level of abstraction, a post-lexical output rule. The symmetrical generalization of such rules would represent rule simplification and maximization of application (Labov 2001). Parallel arguments arise in the constraint-based mechanisms; the generalization of a rule corresponds to an elevation in the ranking of a more general constraint. To what extent can the various causes of sound change advanced be seen as adaptations of language to its environment and environmental needs? Many factors involve shortening of the effort, mental or physical, required for the act of communication. The principle of least effort is such a form of facilitation, as is rule simplification (which may facilitate acquisition as well as production) and the maximization of transparency (which facilitates interpretation and acquisition) (Labov 2001). Labov (1994) argued that when changes in place of articulation are accompanied with conditioned mergers, they may have strong effects upon the morpheme structure rules of a language and so are subject to arguments of rule simplification. Thus one stage of the reduction of final consonants in the unstressed syllables of Greek, Italic and Romance, and Germanic led to a severe limitation on the

features found in final position and in affixes. In many formulations, this would lead to a great simplification of the phonological representation of grammatical formatives.

The diffusion of linguistic features across languages has been studied in considerable daily by Trudgill (1986) and more recently by Auer and Hinskens (1996). My purpose here is to investigate a contrastive study on initial consonant clusters in Kurmanji and to see to what phonological changes occur for the speakers of this language considering the fact that the Kurmanji speakers are living side by side of the dominant Persian speakers. In the next section the phonotactic constraints of consonant clusters in both Kurmanji and the dominant Persian is introduced briefly.

6.1. Syllable structures in Kurmanji

The Kurmanji phoneme inventory is made up of twenty eight consonants, two glides, and eight vowels, (Mostafavi 2007).

Table 4.1. Kurmanji consonants

	Bilabial	Labio-Dental	Dental-Alveolar	Alveolar	Alveo-Palatal	Velar	Uvular	Glottal
Stop	p p^h b		t t^h d			k k^h g	q	ʔ
Affricate					tʃ $tʃ^h$ dʒ			
Fricative		f v	s z	ʃ ʒ			x ɣ	h
Nasal	m	n						
Lateral				l				
Vibrant				r ɾ				
Glide	w				j			

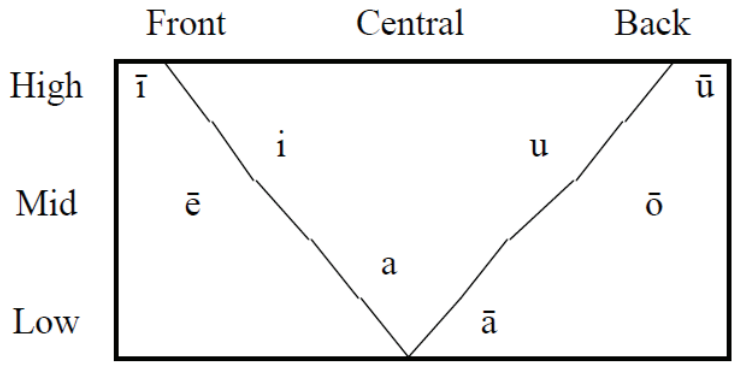


Figure 4.3. Vowel inventory in Kurmanji

Among the vowels i, a and u are short but, *ī*, ē, ā, *ō*, and *ū* are long.

The combination of vowels and consonants to form syllables, in any language, is driven by rules and principles of that language. The maximum syllable in Kurmanji is CCVCC, i.e. it allows, at most, two consonants to fill both onset and coda slots. While onsets are obligatory in syllable structure of this dialect of Kurdish, codas are not, and CCV or CV syllables are abundant. All consonants can appear in the onset and coda slots however, there are some phonotactic constraints that restrict the permissible contents of onset, nucleus, and coda slots. In Kurmanji, of the syllables that begin with two consonants in the onset, only /x, g, k/ can be the first and /w/ the second member as shown in the examples in (19)

(19) Syllable type exemplification (onset clusters)

CCV	CCVC	CCVCC
/xwa/ himself(reflexive pronoun)	/xwaš/ well	/xwand/ I/You/He /We/They read
/xwa.rišt/ stew	/xwaz.ga/ wish	/xwārd/ I/You/He /We/They ate
/xwa.na.wār/ literate	/xwēn/ blood	/xwāst/ I/You/He/We/They married
/xwa.ra.tāw/ the sun	/kwēr/ blind …	
/xwa.šī/ happiness	/gwēz/ walnut	
/kwē.ri/ blindness	/gwēč.ka/ ear	
/gwē.ra.ka/ calf	/xway.šik/ sister	

As long as the frequency of /x/ occurring in initial consonant clusters is more than the two consonants /k,g/, in this study I just investigate the contrastive behavior of the reflexive pronoun /xwa/ along with contact to the dominant Persian.

As discussed in section 4, most phoneticians and phonologists agree on a universal sonority scale in which low vowels are the most sonorous segments, followed in decreasing sonority by mid vowels, high vowels, glides, liquids, nasal stops, fricatives, and oral stops (Clements 1990; Butt 1992; Belvins 1995). In relation to sonority, it is said that across languages, there is a strong tendency for syllables to follow a certain pattern and form a curve of sonority: The nucleus constitutes the sonority peak of the syllable with all other segments organized around it, in such a way that the most sonorous segments are closer to the peak and the least sonorous ones are farthest away from it so that they form a sonority curve like that in Figure 4.4. In a Kurmanji syllable like xwārd (I/you/she/he/it/we/they ate…), segments are syllabified in such a way that sonority increases from the margin to the peak, so that the consonants at the beginning of the onset and at the end of the coda, that are at the bottom end of the sonority scale, are the outermost segments while less marginal consonants, that are adjacent to the vowel, are also closer to the vowel in sonority. This tendency is generalized in the Sonority Sequencing Principle (SSP) discussed above.

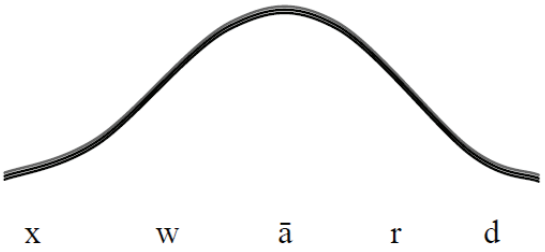


Figure 4.4. The sonority curve in Kurmanji

Sonority increases from the syllable margins towards the syllable peak and decreases from the syllable peak towards the syllable margins. The principle implies that [tr] and [dw] are possible but, *[ks] and *[pn] are impossible onset clusters. In the same way, [st] and [lk] are possible while *[pl] and *[sr] are impossible coda clusters. In all languages, syllables that allow a single consonant to precede and/or follow the nucleus (e.g. CV, CVC syllables), the SSP is obeyed but, in languages where it is possible for

syllables to begin or end in a consonant cluster, adherence to it is less regular, and violations are attested to across languages.

As stated before, across languages, the SSP is preserved in syllables that allow a single consonant to precede and/or follow the nucleus but, it may be violated in syllables that begin or end in a consonant cluster, so the domain of this study is limited to CCV and CCVC, syllable types only (exemplified in 19), which means syllable types that begin with a consonant cluster.

Examples represented in (19) are syllables that begin with a cluster in the onset. They are all native Kurdish words and no borrowed word could be found having a CCV, CCVC, or CCVCC syllable type and, no instance was found among the native Kurdish words violating the SSP. In all these syllables, the only segment that can fill the place of the second member of the onset cluster is the glide /w/. Glides (as stated in (18) above) are the most sonorous segments after vowels so, all onset clusters in this dialect form the sonority curve in Figure 4.4., and conform to the SSP.

6.2. Syllable Structures in Persian

Persian has the syllable structure of CV(CC) which shows that Persian doesn't allow consonant clusters syllable-initially but does allow syllable-finally only up to two consonants. Unlike English, an initial consonant is obligatory in Persian which can be a glottal stop in case of absence any other consonant. In Persian, other than [w] the other consonants can occur syllable-initially. But consonant clusters are prohibited syllable-initially. When it comes to the coda, Persian allows one and two-consonant codas. The simple one-consonant codas can be include all consonants other than [w] and the complex two or three-consonant codas are formed only by junction of two morphological elements. There are no four-consonant clusters found in Persian (Yarmohammadi 2002).

Phonotactic constraints of coda clusters in some cases require a categorization of Persian vowels /a, e, o/ versus /ɑ, i, u/. Samareh (1977, cited in Rohany Rahbar 2009) considered two functionally different groups of vowels with respect to possible following consonant clusters: /a, e, o/ and /ɑ, i, u/. The first group can occur before all combinations

of consonants as far as the first member of the cluster is concerned. The only exception is /e/, which cannot occur before clusters starting with /x/. The vowels of the second group have a very limited occurrence preceding consonant clusters. They cannot occur before those clusters whose first consonant is /q, ʔ, dʒ, z, h, m/. He adds /b, t, d, k, n, l, r/ which occur following the second group of vowels in a few loan words (e.g., /kɑbl/ 'cable', /dubl/ 'double', /ritm/ 'rhythm') and only three Persian words (i.e. /bɑng/ 'shout', /dɑng/ 'share', /pɑrs/ 'the name of a province in Iran'). Samareh continues that the vowels of the second group /i, ɑ, u/ can precede /s, f, x/ combinations — the second consonant must be /t/ with a few exceptions. The consonant /ʃ/ is permitted after /ɑ, u/ but not after /i/. Here is a summary of these observations:

(20) a. / e, a, o/
No restriction on C_1 in C_1C_2#
b. /i, ɑ, u/
*/q, ʔ, dʒ, z, h, m/ as C_1 in C_1C_2#
? /b, t, d, k, n, l, r/ as C_1 in C_1C_2#
√ /s, f, x/ as C_1 followed by /t/ as C_2 (with a few exceptions)

Regarding the consonants that can follow /a, e, o/ and /ɑ, i, u/, Zolfaghari Serish and Kambuziya (2005) mention that in words with CVCC structure, the sonority sequencing principle is met when the vowel is /ɑ, i, u/ (e.g., mɑst 'yoghurt', bist 'twenty', pust 'skin'), but it is not usually met when the vowel is /a, e, o/ (e.g., tabx 'cooking', zebr 'rough', sobh 'morning') - there are some exceptions with /a, e, o/, such as in monosyllabic words - the principle is met if the first consonant of the coda is /r, l, j, n/ and [w] or the second consonant of the coda is /d, ʔ, ʤ, ʃ, k, g, t/. They mention that with respect to the sonority sequencing principle two natural classes of vowels are formed in Persian; these are /ɑ, i, u/ and /a, e, o/. They do not use any feature for these two classes so it is not clear how they treat these vowels with respect to their distinguishing feature. The point is that the categorization of former long vowels versus former short vowels is observed with respect to the sonority principle.

Literature on consonant cluster syllabification focused on syllabification of English consonant clusters learned by Persian learners. Jabbari and Samavarchi (2011) discussed that children who were at the initial state of second language learning were chosen as the participants of the study. They involved the subject in an oral production task in which the words were said by the author twice and the children were asked to repeat the words individually. This task was recorded to see if there were similarities between the first and the second repetition. The result revealed that the learners re-syllabified syllable-initial clusters when they used epenthesis instead of deletion, so one syllable was re-syllabified into two (two-consonant clusters), three or four syllables. This was a negative transfer from Persian. It seems that Persian learners of English encounter difficulty in the pronunciation of initial consonant clusters since there are no initial consonant clusters in Persian. They add a vowel before the cluster or between that to pronounce it easier (Keshavarz 2001). Thus, initial consonant clusters are not allowed by Persian (Yarmohammadi 2002). Sometimes, Persian speakers omit one of the consonants of a final cluster which is made of three consonants. It's another way to simplify difficult consonant clusters (Keshavarz 2001).

6.3. Aims of the study

The second investigation of sound change in Kurmanji is consonant cluster reduction, namely the deletion of /w/ in the cluster /xw-/, which the younger generations tend to simplify. Examples representing the cluster onsets are the reflexive pronoun "xwa" and the verb "xwastin" (want). This case study evaluates the effects of a dominant Persian on the complex onset in the phonological system of bilingual Kurmanji-Persian speakers. Fricative + glide sequences whose structural status as a complex onset is debated in the Kurmanji phonology literature, patterned differently from Persian phonology in which the consonant cluster cannot occur in the onset. As stated in the previous sections, the syllable structure of Persian is CV(C)(C), while the syllable structure in Kurmanji is (C)CV(C)(C). Specific findings are viewed in light of relative markedness of consonant clusters in syllable-initial position in terms of their relationship

to singletons which comprise a simple onset, meaning that only a single segment occupies the prevocalic position and is considered unmarked as compared to those more complex consonant clusters. Determining the phonetic implementation if this phonological contrast in these two languages, i.e. the feature of the categorical phonetic representation, is one of the aim of this study. The extent to which sound changes have occurred in the Kurmanji language of Khorasan is considered through instrumental phonetic investigation in this paper. Unlike the findings from voicing distinctions in Chapter 3 which suggest the approximation of the gestures for the long lag VOTs, investigating the formant analysis of the vowel following the consonant cluster, it is predicted that it would display no trace of /w/ in younger generation of Kurmanji speakers. This expected result would show the reduction of /xw-/ to /x-/ in the onset of Kurmanji syllables and may indicate the categorical shift to the Persian category in which consonant clusters in the onset are not employed.

Considering the initial consonant cluster in Kurmanji, there is strong evidence to suggest that the effect of the phonological structure of the dominant Persian as the causal factor in the loss of oppositions in Kurmanji (external motivation) and the markedness view (unnaturalness due to the difficulty of pronunciation), may contribute to its merger with the unmarked feature. Thus the lack of phonotactic constraints of the consonant clusters in the onset of syllable structure in dominant Persian and the tendency to reduce markedness conceivably could have worked in concert, jointly leading to the loss in Kurmanji and through convergence with Persian.

7. Methodology

7.1. Participants

This study is based on archival recordings of 5 male speakers from Generation1. To match the data, the tokens collected for Generation1 were elicited for the original data collection of Generation2. Both generations lived in northeast of Iran for most of their lives. Participants were bilingual of Persian and Kurmanji. The mean age ±SD of the

participants was 43.2 ±4.6 ranging from 30-55 years old. None of them reported any history of speech disorder.

Formant values of the first and second formant were calculated over the first 23 milliseconds of the vowel /a/ immediately following the consonant cluster using Praat (Boersma & Weenik 2008).

7.2. Materials

A corpus was constructed from Archival and original recordings of Kurmanji speakers. A set of Kurmanji sentences containing the reflexive pronoun "xwa" which begin with a cluster in the onset was compiled. The Generation2 sentences were recorded based upon the archived recordings of Generation1 word lists to manage the data. Finally 36 sentences in which contain the reflexive pronoun /xwa/ were selected from archived recordings of Generation1 and the same sentences were produced with 5 speakers of Generation2.

It is worth noting that based on the literature in standard Kurmanji the vowel following the consonant cluster /xw-/ is /e/, but in the dialect of Khorasani Kurmanji which is my target language in this study, the recorded data shows that the vowel following the consonant cluster /xw-/ is /a/. There exist other variations, as Haig (2004) also mentioned, for the pronunciation of the reflexive pronoun /xwe/, i.e. /xwe/ and /xwa/. But to manage the data and according to the frequency of the reflexive pronoun in Khorasani Kurmanji which shows the high frequency of using /xwa/ by the speakers of Generation1 in this language, I consider /xwa/ to analyze it in this study to show the process of phonological change through the consonant cluster reduction by influencing from intergenerational differences and the dominant Persian.

7.2.1. The reflexive pronoun /xwe/

The personal pronouns of the first and second person have suppletive forms for Direct and Oblique. There is some dialectal variation in the forms of the personal pronouns, in particular the second and third persons (the latter essentially demonstratives),

but it is irrelevant for the present purposes. Only the most important variants in Kurmanji are given in (21).

(21) Pronouns in the Northern Group

		Sing.	Pl.
1. pers.	Dir.	az	em
	Obl.	min	me
2. pers.	Dir.	tu, to, tı	hun, hing
	Obl.	te	(hi)nga, we
3. pers.	Dir.	ew	ew
	Obl.	wı(masc.),we(fem.)	(e)wan

There remain reflexive pronouns in Persian /xodam/ 'myself', /xodat/'yourself', /xodaʃ/ 'him/herself', /xodeman/ 'ourselves', /xodetan/ 'yourselves', /xodeʃan/ 'themselves', formed from /xod/ 'self'. The Kurmanji uses as its root the Kurdish form with what is possibly the old Persian pronunciation, i.e. /xwad/ but the final /d/ is lost; /xwa/ (Soane 1913, 1919, 2003).

Another criterion for establishing the grammatical relation of subject is control of reflexive pronouns. The reflexive pronoun /xwe/ has, in and of itself, no person or number but takes its person and number from the subject of the verb in the clause in which it occurs. It can thus mean, as a possessive, 'my own, 'your own,' 'his/her own,' 'our own,' or 'their own' as well as the objective 'myself,' 'yourself,' 'him/herself,' 'ourselves,' 'yourselves,' or 'themselves.' /xwe/ must be used as both a possessive pronoun and an object pronoun to refer to the subject of the verb, i.e. the personal pronouns cannot be so used.

For Kurdish, at least of the Northern Group, according to Haig (2004), this turns out to be by far the most robust indication of syntactic subjecthood. The facts are as follows. In addition to the personal pronouns given in (21), there is also a non-inflecting reflexive pronoun *xwe / xwa* (Haig 2004). Haig argued that like the other personal pronouns, it can be used both as a full NP, taking an argument position of a verb, or it can

be used as a possessive modifier in an Izafe-construction where it expresses the possessor. The following explanation and examples regarding the reflexive pronoun /xwe/ here are from Haig (2004: 86-89).

Crucially, the rules governing the choice between reflexive pronoun and personal pronoun can only be stated with reference to the grammatical relation of 'subject'. The rule is stated informally in (22).

(22) Use *xwe* instead of a personal pronoun when the intended reference of *xwe* is identical to the syntactic subject of the first verb dominating *xwe*.

The rules governing the reference of *xwe* apply in all tenses, hence are impervious to the morphological form of the syntactic subject. Consider (23). Because the possessor of *diya* is coreferent with the syntactic subject *min*, it is only possible to use *xwe*:

(23)	*min*	*ji*	*di-ya*	*xwe*	*re*	*got*
	1S:OBL	ADP	mother-IZF	REFL	ADP	say:PST:3S

'I said to my mother'

If this clause were to be transposed into the present tense, thereby causing a change in the case form of the subject (from *min* to *ez*), it would not affect the rule requiring *xwe* as the possessor:

(24)	*ez*	*ji*	*di-ya*	*xwe*	*re*	*di-bêj-im*
	1S	ADP	mother-IZF	REFL	ADP	IND-say:PRES-1S

'I say to my mother'

In both of these clauses, the use of the personal pronoun *min* as a possessor (*diya min* 'my mother') would be ungrammatical. *xwe* can occur as possessor in an Izafe construction, as in the above examples, or in argument function. However, the rule requiring coreference with the syntactic subject precludes *xwe* occurring in subject function itself (but see below). The domain within which the reference of *xwe* is defined is strictly local, namely the immediately dominating predicate. In the following example a main verb *xwastin* 'want, request' is followed by a subordinate clause with a different

subject. The constraints on the reference of *xwe* do not carry over from the main to the subordinate clause:

(25) *min jê xwast ku wer-e mal-a min/ *xwe*
1S:OBL from.him want:PST(2S) COMP come:IRR:PRES-3S house-IZF 1S:OBL/ *REFL
'I asked him to come to my house' (Abdullah Incekan, p.c.)

The only way of rendering the intended meaning is to use the personal pronoun *min* as the possessor of *mal 'House'*. If *xwe* were used here, it would be interpreted as coreferential with the subject of the immediately dominating verb, here *wer-e* 'come', yielding 'to his house'. The strictness with which these rules are observed is considerable, and has been underestimated even by experienced researchers. The following example is from the text collection in Lescot (1940).

(26) *Carkê bav-ê$_i$ wê nerî go*
When father-IZM DEM:OBL(fem.) see:PST COMP
kîz-a wî$_i$ hat
girl-IZF DEM:OBL(masc.) come:PST
'When her father$_i$ saw that his$_i$ daughter had arrived . . . ' (Lescot 1940:8)

In the notes accompanying the text, Lescot (1940:246) corrects the use of the possessive expression *kîza wî*, stating "Il faudrait: *kîza xwe*". But he is mistaken; the text is fully correct as it stands. The possessor must be the third person, rather than the reflexive, because it is part of the subject NP. As mentioned, the relevant domain is the immediately dominating verb, in this case the verb *hat* 'come', of which *kîza wî* is the subject. Coreference with the main-clause verb *nerî*, on the other hand, is irrelevant. Control of reflexives cannot cross clause boundaries in Kurdish.

Despite these latter complications, for most of the Northern Group control of reflexive /*xwe*/ is the single most robust diagnostic of syntactic subjecthood available in the language.

Here are some sentences containing the reflexive pronoun /xwa/ collected to analyze in this study.

(27) *wan nan-e xwa xar-ən tʃun.*
3P:OBL dinner-IZM REFL eat:PST:3P leave:PST:3P

‘They had their dinner and left’

(28)	*min*	*ʔaw*	*la*	*mal-e*	*xwa*	*di*
	1S:OBL	DIR:PL	in	house-IZM	REFL	see:PST:1S

‘I saw them in my house’

(29)	min	nan-e	xwa	wə	berə-j	xwa	xar
	1S:OBL	dinner-IZF	REFL	with	brother-IZM	REFL	eat:PST:1S

‘I had dinner with my brother’

7.3. Recordings and measurements

The old data from the first generation were gathered in the field with the magnetic recordings; and to make the old data usable in the new phase of the Linguistic Atlas of Iran, the old data available on magnetic tapes were digitized. The Kurmanji data of the Generation1 were available from the mentioned archive. The recordings of 5 male speakers from the old data were analyzed. Managing the study, 5 male speakers from generation2 recorded the target stimuli. The recordings of the Generation1 were made in the field, whereas recordings of Generation2 were made in quiet surroundings. Most often in speakers’ homes, using a Zoom H4 recorder with built-in variable XY stereo microphones recording direct to .wav format (44.1 KHz/32 bit).

Recording the data for Generation2, and to manage the data gathering exactly the same as Generation1’s recordings, the same sentences were presented and the participants were asked to repeat twice the Kurmanji corresponding of the Persian forms, in a natural way, without any marked intonation.

Subsequently, the Formant values of the first and second formant were calculated over the first 23 milliseconds of the vowel /a/ immediately following the consonant cluster using Praat (Boersma & Weenik 2008). Formant transitions for the vowels adjacent to the consonant cluster /xw-/ produced by Generation1 and for the vowel adjacent to the fricative /x-/ in Generation2 were computed during the 23 milliseconds. Following Gordon et al. (2003) the fricatives targeted for measurements of their vowel transitions were those which were profitably differentiated through their transitions or

which were otherwise relatively poorly separated through other measurements taken, i.e. fricatives distinguished through rounding, targeted in this study.

7.4. Statistical Analysis

Advanced statistical methods were used in order to consider the main effects of all factors as well as factor-by-factor interactions. The General Linear Model (GLM) univariate procedure, which provides analysis of variance for one dependent variable by one or more factors or variables, was considered to be an appropriate model in this study. The General Linear Model (GLM) univariate analysis of variance (ANOVA) was used to assess the differences of F1 and F2 values between simple and complex initial consonant clusters in Generation1 and Generation2. Two separate univariate analysis of variance were utilized to investigate the effect of Generation on the variations of the adjacent vowels. Another separate univariate analysis of variance was used to assess the effect of inter-speaker variation on consonant cluster reduction. An alpha level of .05 was set as the level of significance. The relative effect size of each factor and factor interactions were also calculated. SPSS 20.0 statistical software was used for all of the descriptive and analytic statistics.

8. Results and discussion

Formant values for the first and second formant were calculated over the first 23 milliseconds (512 points) of the vowel /a/ immediately following the consonant clusters /xw-/ and /x-/. Figure 4.5 represents the location of vowel /a/, adjacent to the consonant cluster variations of the reflexive pronoun produced by speakers of Generations 1&2. Examining the spectrograms also confirms the measurement landmarks. Figure 4.6 shows landmarks for the trace of the glide /w/ preceding the adjacent vowel. The results averaged over the Generation1 indicate that F2 generally increases between the glide /w/ and the adjacent vowel; F1 also increases from a prevocalic semivowel into the following vowel. The results indicate that after this increasing, rounding triggers substantial lowering of the second formant, during the consonant to vowel transition in the consonant

cluster /xwa/, while there is no formant lowering during the formant transition of fricative to vowel transition in /xa/. Comparing the two occurrences of the reflexive pronoun in Generations 1&2, it is apparent from the figures 4.7 and 4.8 that although there is no formant lowering during the formant transitions in /xa/ produced by Generation2, there is still the trace of the glide /w/ which shows the small increasing of the second formant while producing the /xa/ by the speakers of Generation1. The importance of formant transition between from the fricative+glide cluster to the adjacent vowel will be explained precisely in the section 8.

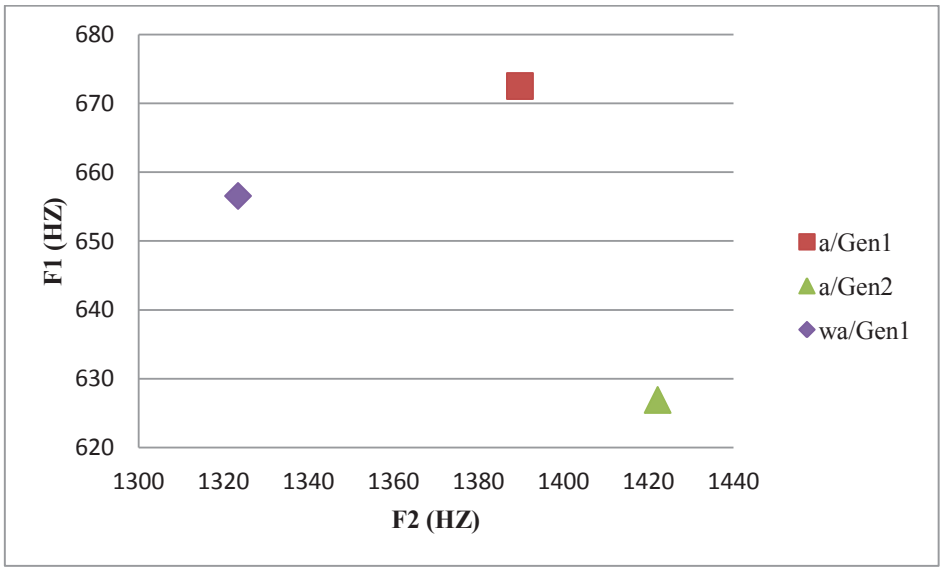


Figure 4.5. Location of vowel /a/, adjacent to the consonant cluster variations of the reflexive pronoun produced by speakers of Generation1&2

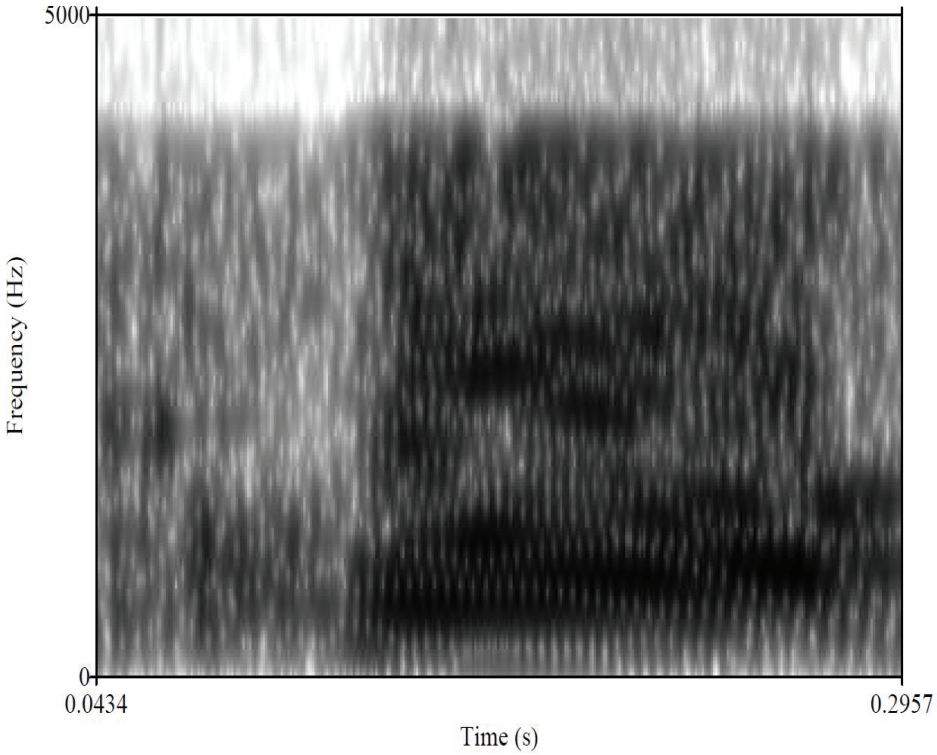


Figure 4.6. The spectrogram of /xwa/ produced by Generation1

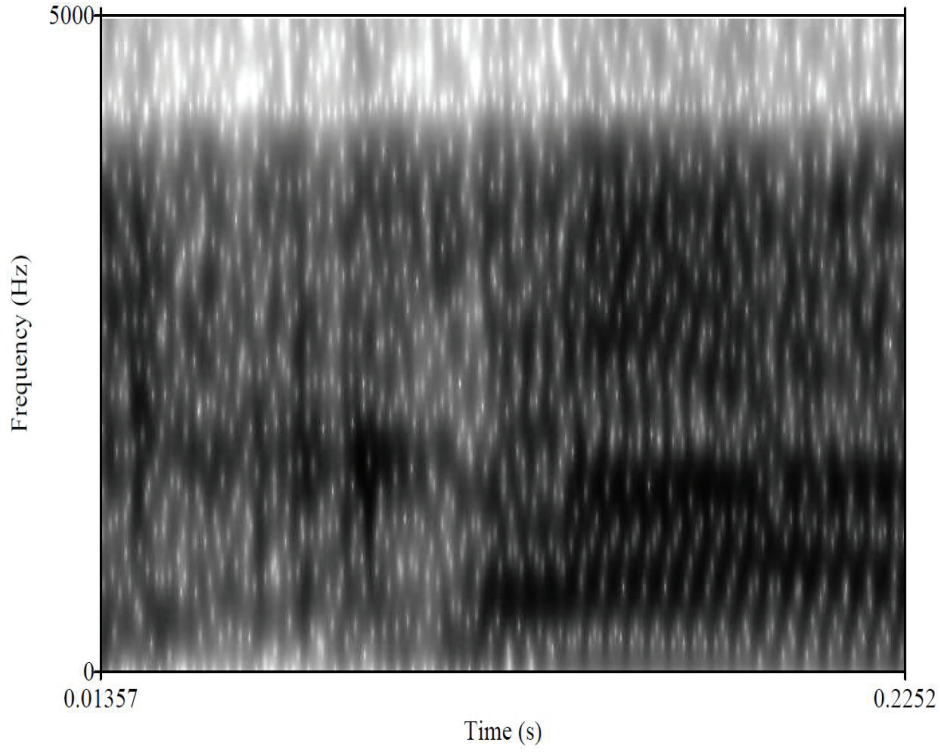


Figure 4.7. The spectrogram of /xa/ produced by Generation1

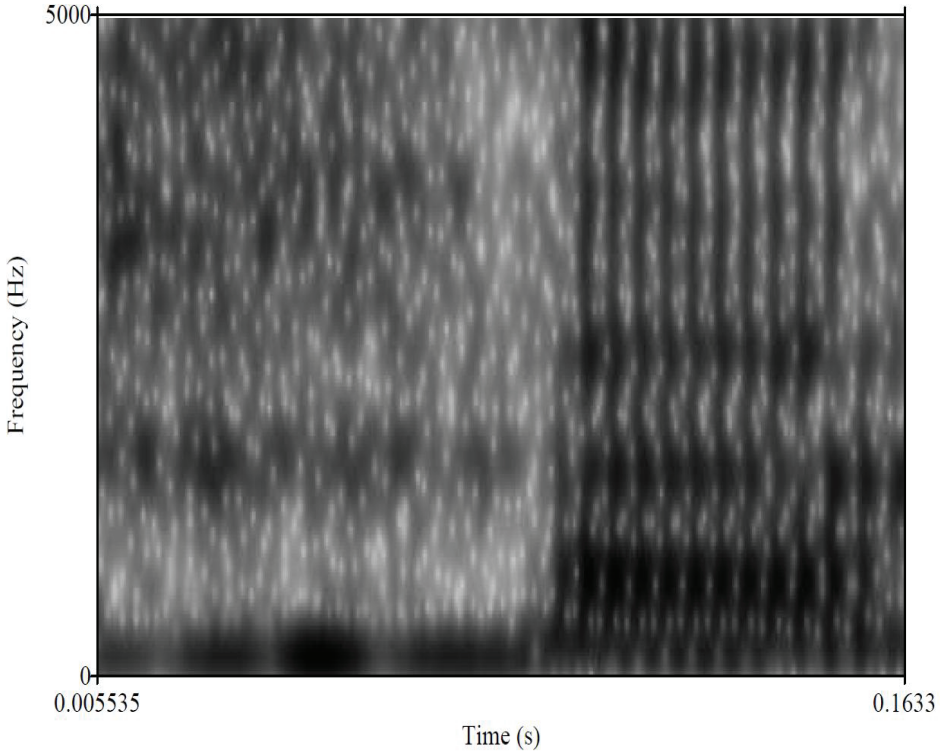


Figure 4.8. The spectrogram of /xa/ produced by Generation2

Figures 4.9 and 4.10 show the percentage of producing consonant cluster variation in each generation. Figure 4.9 represents the distribution of reflexive pronoun variation in Generation1 produced with 5 speakers. It is clear from this diagram that 56.3% of the tokens were the consonant cluster /xwa/ while 43.7% of the tokens was the reduced consonant cluster and produced as simple cluster, /xa/.

Figure 4.10 represents the distribution of reflexive pronoun variation in Generation2. As expressed in the diagram, none of the speakers produce the consonant cluster /xwa/. As predicted, the frequency of the variation /xa/ was also reduced by the speakers in Generaion2. Meanwhile, another variation occurred which was not produced by Generation1. The data displayed in the diagram indicate that the speakers in Generation2 tend to produce the variation /xo/ for the reflexive pronoun (57.8%) and only 42.2% of the tokens were pronounced as /xa/.

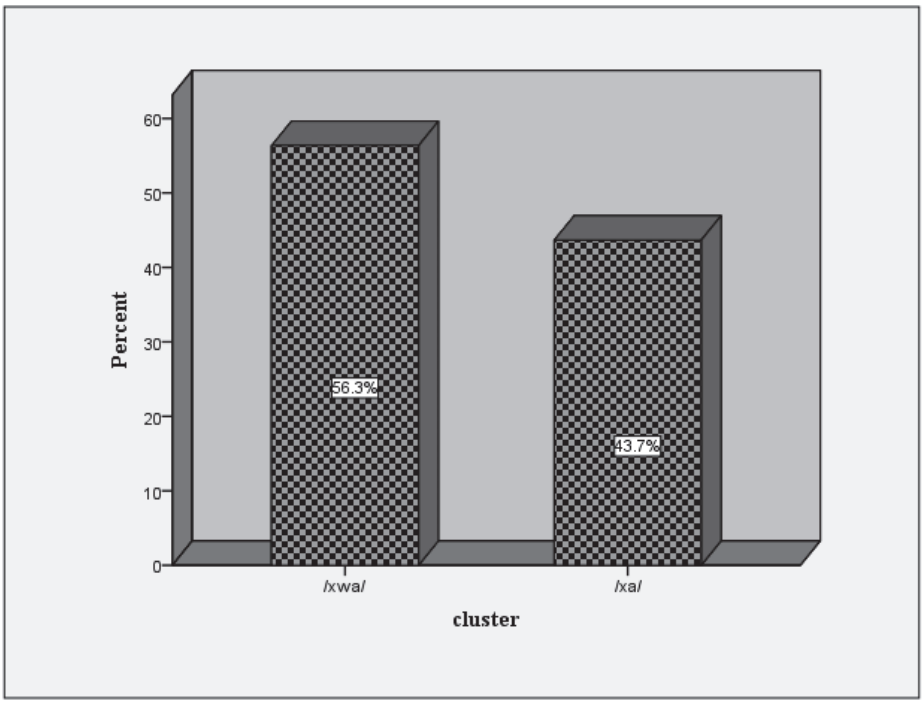


Figure 4.9. Percentage of the reflexive pronoun variations produced by Generation1 speakers

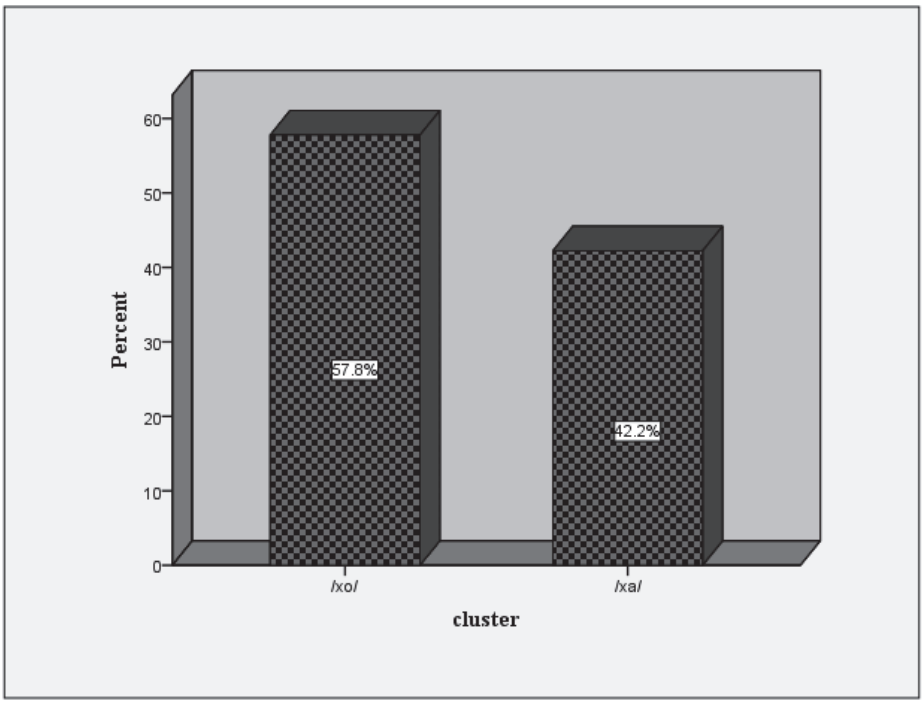


Figure 4.10. Percentage of the reflexive pronoun variations produced by Generation2 speakers

The F1 and F2 values (Hz) for the vowel /a/ adjacent to the consonant cluster /xwa/ and the simple cluster /xa/ of the reflexive pronoun in Kurmanji are displayed in Tables 4.2 and 4.3. Mean, Standard Deviation (SD) and number (N) of tokens are shown for each speaker separately. Speakers M1, M2 and M3 from Generation1 produced the reflexive pronoun with the consonant cluster /xwa/ while two speakers of Generation1, M4 and M5, reduced the consonant cluster and produced it with the simple cluster /xa/. From five speakers of Generation2, only two of them, M6 and M7, produced the reflexive pronoun by reducing the consonant cluster, i.e. /xa/. The other three speakers from Generation2 produced /xo/ for the reflexive pronoun. To manage the data, I just collected the recordings of the speakers M6 and M7 which produced /xa/ and compared it with the recordings for Generation1 speakers.

Table 4.2: Mean and Standard Deviation of F1 values (Hz) for the vowel /a/ adjacent to the consonant cluster /xw-/ and the simple cluster /x-/, the two variations of the reflexive pronoun /xwe/ in Kurmanji

Mean and SD for F1 values (HZ) of the vowel /a/ adjacent to the consonant cluster in Kurmanji Generation1&2 produced by 7 speakers					
speaker	cluster	Generation	Mean	SD	N
M1	xwa	Gen1	656.641	41.208	23
M2	xwa	Gen1	684.661	69.294	28
M3	xwa	Gen1	652.475	54.186	20
M4	xa	Gen1	676.506	53.878	28
M5	xa	Gen1	705.837	47.263	27
M6	xa	Gen2	688.907	35.237	29
M7	xa	Gen2	670.699	30.061	28
Total	xwa	Gen1	672.592	60.279	71
	xa	Gen1	691.171	58.854	55
		Gen2	679.703	36.244	57
	Total	Gen1	681.881	59.498	126
		Gen2	679.703	36.244	57
		Total	680.792	53.291	183

Table 4.3: Mean and Standard Deviation of F2 values (Hz) for the vowel /a/ adjacent to the consonant cluster /xw-/ and the simple cluster /x-/, the two variations of the reflexive pronoun /xwe/ in Kurmanji

Mean and SD for F2 values (HZ) of the vowel /a/ adjacent to the consonant cluster in Kurmanji Generation1&2 produced by 7 speakers					
speaker	cluster	Generation	Mean	SD	N
M1	xwa	Gen1	1264.633	74.461	23
M2	xwa	Gen1	1307.415	63.711	28
M3	xwa	Gen1	1217.550	106.220	20
M4	xa	Gen1	1354.075	52.105	28
M5	xa	Gen1	1375.430	51.961	27
M6	xa	Gen2	1429.136	20.495	29
M7	xa	Gen2	1431.477	31.967	28
Total	xwa	Gen1	1268.243	87.880	71
	xa	Gen1	1364.551	52.664	55
		Gen2	1430.286	26.535	57
	Total	Gen1	1310.285	88.448	126
		Gen2	1430.286	26.535	57
		Total	1347.662	93.246	183

As stated in Tables 4.2 and 4.3, the number of tokens for 5 speakers of Generation1 is 126 from which, 71 tokens are the consonant cluster /xwa/ and 55 tokens are the simple cluster /xa/. The number of tokens in Generation2 produced by two speakers M6 and M7 are 57 simple clusters /xa/. The three other speakers from Generation2 produced /xo/ for the reflexive pronoun.

As it is evident in Table 4.2, the mean value of F1 between speakers of two generations is not significant. The GLM univariate analysis of variance confirms this similarity, indicating that the differences between the F1 values of vowels adjacent to two different variations, /xw-/ and /x-/ (effect of consonant cluster), regardless of inter-speaker differences and inter-generational differences, is not significant ($F(1,176)=.112$, $p=.918$). The same test revealed that there is no significant differences between the F1 values of vowels adjacent to the consonant clusters between two generations (effect of Generation) ($F(1,176)=.511$, $p=.476$). Thus the ANOVA tests including consonant

cluster and Generation as independent variables indicated no significant difference on F1 transitions.

Considering the mean value of the second formant F2 for each speaker producing two variations of reflexive pronoun displayed in Table 4.3, it is clear that the mean value of F2 for the vowel adjacent the consonant cluster /xw-/ is lower than the F2 value of the vowel adjacent to the simple cluster /x-/. This difference is due to the trace of the glide /w/ next to the adjacent vowel in which the rounding triggers substantial lowering of the second formant during the consonant to vowel transition. Thus during the consonant to vowel transition there is a significant difference between the values of the second formants of the vowel following /xw-/ and /x-/. The GLM univariate analysis of variance (ANOVA) indicated that the differences between the F2 values of vowels adjacent to the two different variations, /xw-/ and /x-/ (effect of consonant cluster), regardless of inter-speaker differences and inter-generational differences, were highly significant ($F(1,176)=216.866$, $p<.0001$). The same test revealed that the F2 values of vowels adjacent to the consonant clusters were also highly significant between the two generations (effect of Generation) ($F(1,176)=174.736$, $p<.0001$). The ANOVA analysis revealed significant effect of consonant cluster differences in F2 transition values in Generation1 and exerted less than but almost significant effect of Generation differences in F2 transition values of the vowel following the clusters.

Furthermore, standard deviations of the formant frequency are different from person to person, as well as from the first formant to the second formant, which indicates the size of inter-speaker variation on the followed vowel. It can be seen in Table 4.3 from Generation1 that F2 of the vowel following the cluster /xw-/ produced by the speakers M1, M2, M3 has greater standard deviation (88.448), than F2 of the vowel following the fricative /x-/ produced by the speakers M4 and M5 (52.664). In addition, considering the speakers in two generations who produced the reflexive pronoun by reducing the consonant cluster, i.e. /xa/, F2 of /a/ produced by speakers M4 and M5 in Generation1 has greater standard deviation (52.664) than the standard deviation of F2 (26.535) of /a/ produced by the speakers M6 and M7 from Generation2. This may be due to the stronger

coarticulation between the glide /w/ and the following vowel on F2 (Cuiling et al., 2000, 2005). The findings which illustrate the greater standard deviation of F2 for the speakers M4 and M5 from Generation1 than for speakers M6 and M7 from Generation2 revealed that the trace of coarticulation by the effect of the glide /w/ still occurred in the production of the speakers M4 and M5. Besides, F2 reflects the anatomy and state of the articulatory organs of speakers more directly.

Figure 4.11 represents the interaction plot between the effects of Generation on the F2 values of the vowel adjacent to the clusters. As is evident from the interaction plot, mean F2 values of the vowel /a/ adjacent to the fricative /x-/ is higher than the vowel adjacent to the consonant cluster /xw-/ Since the Generation2 speakers didn't produce the consonant cluster /xwa/ as reflexive pronouns, the circle on the top of the plot shows the value of F2 for the variation of /xa/ produced by Generation2.

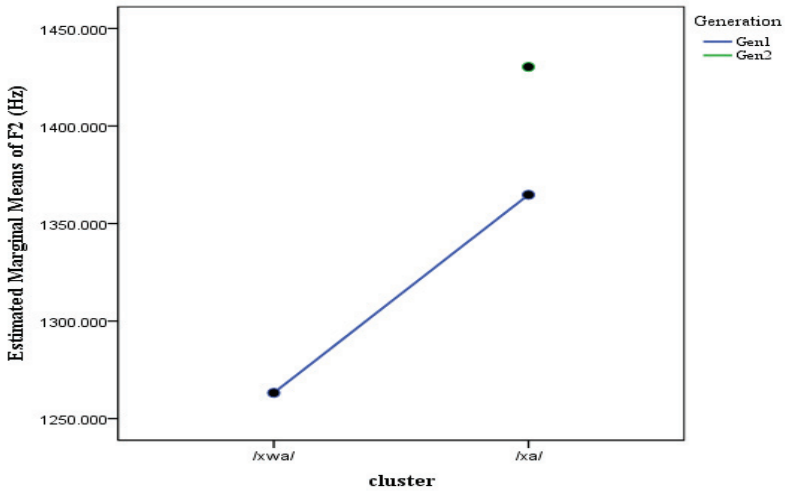


Figure 4.11. Interaction plot of the mean F2 of the vowel adjacent to the cluster variations in two Generations of Kurmanji speakers

Each speaker has his own individual features of speech that cannot be superseded by other people even though sometimes a successful imitation or disguised voice can confuse two speakers. Considering the inter-speaker variation, I analyzed the variability in the acoustic signal among different speakers producing the same cluster. Although, humans can quite often correctly recognize the same sound enunciated by different

speakers, there are significant differences in the pressure variations and therefore the frequency content of these signals corresponding to the same perceived sound. The classic study of Peterson & Barney (1952) found that the same vowel produced by different speakers have very different formant frequencies (or dominant resonances) while different vowels spoken by different speakers can have very similar formant (or dominant) frequencies. This is shown in Figure 4.12 which shows the inter-speaker differences of producing the vowel /a/ following the clusters /xw-/ and /x-/.

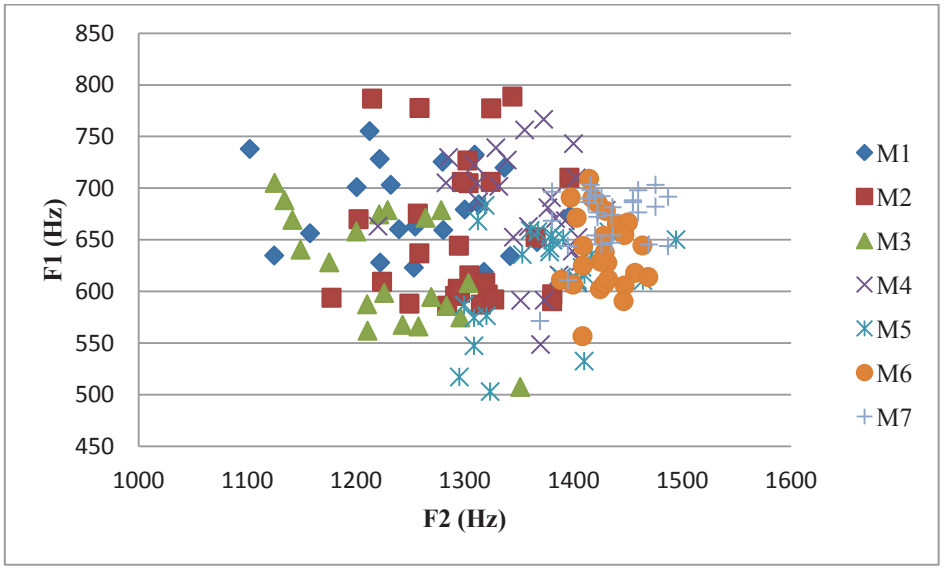


Figure 4.12. The location of the vowel /a/ with significant variations of F1 and F2 produced by seven Kurmanji speakers in two generations

Average F1 values for vowel /a/ following the cluster /xw-/ is around 672 Hz while the average for the unrounded one following the fricative /x-/ is approximately 691 Hz, producing by speakers of Generation1. Vowel /a/ following the fricative /x-/ produced by the two speakers of Generation2 has an average F1 value of 679 Hz.

An ANOVA including speaker as independent variables indicated a less than but almost significant effect of speaker on F1 transitions, ($F(6,176)=6.901$, $p<.001$). Bonferroni post-hoc tests pinned to the ANOVA indicated a significant difference in F1 values of the following vowel each speaker produced. Table 4 represents the inter-speaker variations for F1 values of the vowel /a/ resulting from the post-hoc test. As

evident in Table 4.4, less inter-speaker variation is shown of F1 differences, since the ANOVA test revealed less significant effect of F1 transition as stated above.

Table 4.4. Post-hoc tests for the effect of inter-speaker variation on F1 values of the vowel following the two clusters /xw-/ and /x-/. Significant differences marked with asterisk (α<.05)

	M1	M2	M3	M4	M5	M6	M7
M1		1.000	.008*	1.000	.000*	.130	1.000
M2	1.000		.533	1.000	.075	1.000	1.000
M3	.008*	.533		.004*	1.000	1.000	.019
M4	1.000	1.000	.004*		.000*	.086	1.000
M5	.000*	.075	1.000	.000*		1.000	.001*
M6	.130	1.000	1.000	.086	1.000		.311
M7	1.000	1.000	.019	1.000	.001*	.311	

The same test of ANOVA including speaker as independent variables revealed that the difference between the F2 values of the vowel /a/ following the two consonant clusters regardless of the effect of Generation, is highly significant ($F(6,176)=44.488$, $p<.0001$). Table 4.5 represents the results of post-hoc tests indicating the high significant differences in F2 values between seven speakers.

Table 4.5. Post-hoc tests for the effect of inter-speaker variation on F2 values of the vowel following the two clusters /xw-/ and /x-/. Significant differences marked with asterisk (α<.05)

	M1	M2	M3	M4	M5	M6	M7
M1		.249	.227	.000*	.000*	.000*	.000*
M2	.249		.000*	.083	.001*	.000*	.000*
M3	.227	.000*		.000*	.000*	.000*	.000*
M4	.000*	.083	.000*		1.000	.000*	.000*
M5	.000*	.001*	.000*	1.000		.020	.013
M6	.000*	.000*	.000*	.000*	.020		1.000
M7	.000*	.000*	.000*	.000*	.013	1.000	

Considering F1 and F2 differences based on statistical analysis, the results revealed that the mean formant frequencies vary substantially across the 7 speakers. F2 shows greater individual speaker variation than F1. Generally speaking, it can be seen from results of ANOVA tests that there is greater standard deviation of F2 than F1, and F2 variation is more reliable for examining the differences in vowel /a/ following the

consonant clusters. This may be due to the stronger coarticulation between the glide /w/ and the following vowel on F2 (Cuiling et al., 2000, 2005). Besides, F2 reflects the anatomy and state of articulatory organs of speakers more directly.

The results averaged over the seven speakers indicate that rounding triggers substantial lowering of the second formant and to a lesser extent the first formant, during the consonant-to-vowel transition in the consonant cluster /xwa/, while there is no formant lowering during the formant transition of fricative to vowel transition in /xa/. F2 values taken during the transitions were significantly lower for the rounded fricatives relative to the unrounded ones (see Ladefoged & Maddieson 1996 for similar effects in Pohnpeian). Figure 4.13 which represents the second formant calculated over the first 23 milliseconds of the vowel /a/ immediately following the consonant clusters /xw-/ and /x-/, in two generations supports this observation which is in accordance with the findings in Montana Salish, by Gordon et al. (2003).

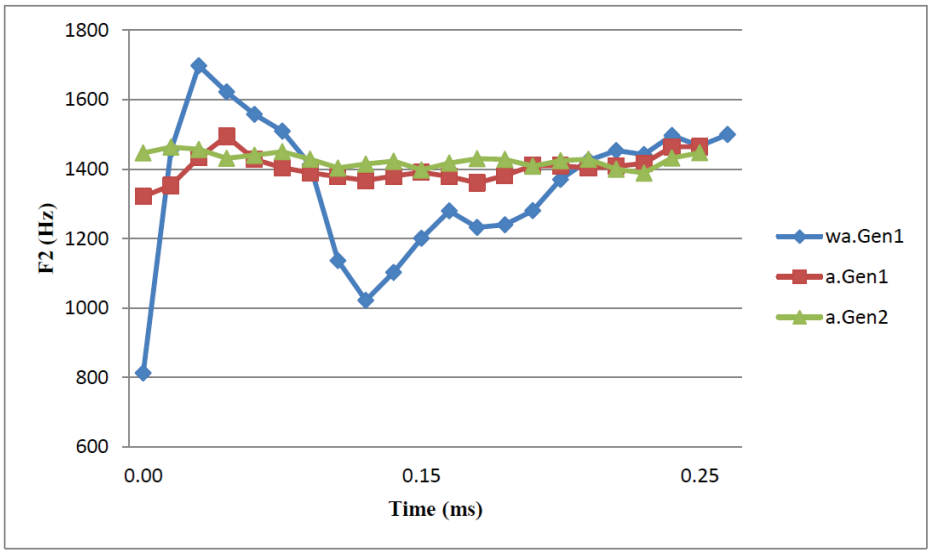


Figure 4.13. F2 transitions in vowel /a/ adjacent to /xw-/ and /x-/ in Generations1&2

The data presented above illustrates that all speakers in Generation2 reduced the consonant cluster /xw-/ and replaced it with /x-/ when producing the reflexive pronoun /xwa/ in Kurmanji. As discussed in previous sections about the tendency of consonant complexity reductions in languages (Clements 1990, Butt 1992, Blevins 1995,

Maddieson 1997, 2008, 2010, Kreitman 2012, among others) two speakers of Generation1 and all the speakers of Generation2 reduced the consonant cluster. This phonetic motivation no longer underlines the phonological rule of initial consonant clusters in Kurmanji. It is important to note that this change causes no effect on the intelligibility of the language as no phonological contrast is neutralized. The problem is, the unique phonological feature i.e. initial consonant cluster, which is rare in Iranian languages was lost. Such a change is rather common in contact-induced situations and is included in the Thomason and Kaufman (1988:75) typology of contact-induced structural effects. In cases of intense contact, phonological borrowing includes the phonemicization of allophonic alternations (Babel 2008). Speakers of Generation2 and two speakers from Generation1 appear to be doing something similar, in their shift from /xw-/ to /x-/, they have adopted a phonological feature from Persian to serve as their consonant cluster /xw-/.

More importantly, what has been the path of this phonological change? It is conceivable that the Persian single cluster was substituted for the Kurmanji initial consonant cluster because of the lack of the initial consonant cluster in Persian. It is highly implausible that this sound change occurred as the result of approximation from initial consonant cluster to the single cluster in Persian. A more likely path to the change involves transfer where the initial consonant cluster reduction was incorporated into their phonological system during the period of heavy Persian use or, perhaps, during their concurrent acquisition of two languages, i.e. Persian and Kurmanji, as a child.

9. Discussion

This chapter set out to address the phonological changes in “reflexive pronoun /xwa/” Kurmanji speakers of Generation1 and 2 produced in different variations.

From a phonetic perspective, formant transitions proved useful in discriminating between clusters and in distinguishing the degrees of rounding among the back fricatives the trace of the approximant /w/ on the following vowel. In trying to account for what was found about formant transition in other languages, Gordon et al. (2003) claimed that

in Hupa and Montana Salish, rounding is generally associated with lowering of the first two formants. Thus, the rounded velars and uvulars in Montana Salish have lower F1 and F2 values in their vowel transitions than the unrounded uvulars. They found that in Hupa, which observes a three way rounding contrast among the velars, unrounded /x/, rounded /xw/ and more rounded /x^{w}w/, the greater the degree of rounding of the velar, the lower F2 values are in the adjacent vowel transition. They provided an explanation for F1 and suggested that rounding also triggers lowering of F1 in adjacent vowels although this effect is limited to low vowels as predicted by vocal tract models. Gordon et al. (2003) noted that the lowering effect of rounding on formant transitions, particularly F2 increases the length of the cavity anterior to the constriction lowers the natural resonating frequencies of the front cavity, F2 especially and to a lesser extent F1 in low vowels, not only during the fricative but also during the transitions into adjacent vowels.

Based upon the results of the Kurmanji speakers producing the two variations of reflexive pronoun /xwe/ in two generations, rounding triggers substantial lowering of the second formant and to a lesser extent the first formant, during the consonant-to-vowel transition in the consonant cluster /xwa/, while there is no formant lowering during the formant transition of fricative to vowel transition in /xa/. F2 values taken during the transitions were significantly lower for the rounded fricatives relative to the unrounded ones. The formant analysis of the vowel adjacent to the consonant clusters in reflexive pronoun variation in Kurmanji clearly supported Ladefoged & Maddieson's (1996) assersions for formant transitions on labialized consonants to the adjacent vowels (see section 4.3 further explanation). My results are also in accordance with the findings in Montana Salish, by Gordon et al. (2003) described above.

In trying to account for what was known about consonant cluster complexity and its reduction at the time, Clements (1990, among others) suggested that relative featural markedness between clusters is also characterized linguistically in terms of sonority distance. Based on the sonority sequencing principle (SSP), markedness relationships between different types of onsets can be established. The SSP requires that syllables rise maximally from the onset to the nucleus (Clements 1990). Accordingly, a syllable that

begins with a stop in the onset is preferable to a syllable that begins with a fricative. Fricative onsets, in turn, are preferred over nasal onsets, and so on. Additional markedness relationships obtain with respect to different types of complex onsets. Specifically, sonority distance is inversely related to relative markedness. That is to say, the least marked complex onset would show a steep sonority slope between the two consonants, meaning that the two consonants are maximally different in sonority. Thus, the greater the distance between two segments along the sonority scale, the less marked the cluster is. A stop+glide cluster is less marked than a fricative+glide cluster. Similarly, a stop+liquid cluster is less marked than a fricative+liquid cluster.

Gierut's (1999) study of the role of the SSP in the treatment of clusters in children with phonological delay supported the implicational relationship between marked clusters (those with a smaller sonority distance) and unmarked clusters (those with a greater sonority distance). For example, treatment on a fricative+liquid cluster resulted in change in all less marked clusters such as fricative+glide, stop+liquid, and stop+glide clusters. In addition, a gradient pattern of learning was observed whereby least marked clusters showed the highest degree of accuracy following treatment, while accuracy levels for other clusters gradually decreased as markedness increased (that is, as sonority distance decreased). Thus, voiceless stop+glide sequences, for example, showed the highest levels of accuracy, while fricative+glide clusters showed lower levels of accuracy, and fricative+liquid clusters were yet lower in accuracy.

Given that both structural and sonority-based markedness are assumed to be a cross-linguistic phenomenon, it is predicted that such implicational relationships between onset cluster types will hold across language change. Only a handful of studies have considered markedness relationships of any kind in cross-linguistic phonological change research.

Returning to the study of consonant cluster reduction in the Kurmanji reflexive pronoun, the results in this study illustrated that Kurmanji's phonological system in Generation2 simplified all initial consonant clusters, including consonant+glide sequences, generally to singletons. Following the assumption that consonant+glide

sequences are complex onsets in Kurmanji, my analysis of Kurmanji clusters established the most marked complex onsets of the Kurmanji language, comparing to the dominant Persian which does not allow the onset clusters, to be the fricative+glide sequences in onset, as in the reflexive pronoun [xwa] ‘‘self’’.

Furthermore, consistent with Gierut’s (1999) findings, gradient levels of using the consonant cluster were observed in Kurmanji, in which the tendency of reducing the consonant cluster in Generation1 and producing the unmarked single cluster /x-/ occurred in 43.7% of the tokens, and most marked fricative+glide clusters occurred in 56.3% of the tokens. On the other hand, it appears from the results of Generation2 that not only did the speakers never produce the marked fricative+glide clusters, but also they tended to produce the reflexive pronoun using the variation of /xo/ (57.8%) instead of /xa/ which only 42.2% of the tokens pronounced it as /xa/.

From the sociolinguistic view, the tendency of producing /xo/ is based on the effect of the dominant Persian in which the reflexive pronoun is produced as /xod/ (see section x) and the speakers in Generation2, affected by the strong influence of Persian, used it as Kurmanji reflexive pronoun by dropping the /d/ in the coda and produced it as /xo/.

Thus, it appears that structural and sonority-based principles of syllable markedness also are supported in research with language change. These findings are not unexpected, given that these types of markedness are presumably cross-linguistic phenomena; nevertheless, there still is a need for additional evidence to support these findings. Should we observe that this prediction is not held, this would require a reconsideration of the universality of structural and featural markedness.

Results of this study indicate that it may be possible and indeed effective to introduce new sounds simultaneously with new structures (though there may be limitations to this; see Gierut, & Champion, 2001). Thus, the generalization from clusters to singletons that has been documented in previous studies appears to have occurred in this present study as well. Thus, the findings show preliminary support for markedness predictions. The introduction of a relatively marked cluster into the speaker’s sound

system appears to have led to improvements on the relatively unmarked tap singleton. In fact, speakers showed higher tendency on the unmarked singleton as compared to the marked cluster, despite the fact that the cluster was targeted in the study.

Understanding the variations discussed above has important implications in many areas of speech processing. Based upon the results discussed in on the previous section which indicated high significant differences of the formant values of the vowel following the clusters affected by inter-speaker variation, it is worth noting that speaker-related information is classified into personal variation and socio-linguistic variation. Ladofoged & maddieson (1996) classified the sources of variation in speech signal into linguistic or phonemic variation and speaker-related variation. Personal variations are due to differences between speakers in the shape and size of their vocal tract and larynx and correspond to anatomical or physiological variations. Socio-linguistic variations originate from differences in regional background, education level and gender of speaker. A more detailed analysis can be found in Adank (2003) and Adank et al. (2004). Some researchers also attribute a third source of variation to the emotional state of the speaker. Physiological variations are often regarded as the major source of inter-speaker variations. In this study, in addition to physiological differences, one might be the differences in sociological differences of the speakers such as the intergenerational differences from Generation1 and 2, as well as the age and the social class of the speakers. The speakers in Generation1 were all selected from rural areas and there was not enough information about their literacy, since the data from Generation1 were selected from archival records, whereas the speakers in Generation2 were lived in the big city and all of them were educated.

These findings in particular show that comparative evidence of Kurmanji and the dominant Persian heightens the probability that the internally motivated and externally motivated changes may occur alongside each other, even affecting the same part of the phonemic inventory. Formant transitions proved useful in discriminating between the fricative+glide clusters (xw-) and the fricative (x-) alone, and in distinguishing degrees of rounding after the consonant clusters in Generation1 and Generation2. Formant

transitions in Generation2 do not associate with lowering the F2 values of the adjacent vowel. Thus the consonant cluster /xw-/ substituted with the singleton /x-/, a more likely path to the change involves transfer where /x-/ was incorporated into speakers' Kurmanji system during a period of heavy Persian use or during their concurrent acquisition of the two languages as a child.

The lack of initial consonant clusters in dominant Persian as the causal factor in the loss of initial consonant clusters in Kurmanji Generation2 (external motivation), and the tendency to reduce markedness (/xw-/ being marked) conceivably could have worked in concert, jointly leading to the loss in Kurmanji Generation2. This is likely because Generation2 speakers in the northeast of Iran do not form a cohesive Kurmanji community compared to Generation1 and therefore have no opportunity to talk casually outside of their homes, thus, they merge into the dominant Persian and the fricative+glide /xw-/ produced as the reflexive pronoun by Generation1 is never produced by Generation2 speakers and it was completely lost through consonant cluster reduction and using /x-/ heavily, affected by the dominant Persian.

The formant analysis of the vowel following the consonant cluster displayed no trace of /w/ in the younger generation of Kurmanji speakers. This result shows the reduction of /xw-/ to /x-/ in the onset of Kurmanji syllables and indicates the categorical shift to the Persian category in which consonant clusters in the onset are not employed.

This chapter argues that sound change in the Kurmanji language may manifest substitution (Transfer) or approximation/expansion of phonological categories resulting in convergence with or divergence from the dominant language, in the targeted moribund language. Social factors influencing mechanisms and outcomes include the reason for the language contact, the dominance of the group speakers, the amount of social and cultural pressure groups exert on each other, and the relative instrumental value of the languages. Instrumental value is a measure of how useful the language is for the economic and social advancement of the speaker (O'Shannessy, 2011).

Campbell and Muntzel (1989) review two types of phonological change that can occur in obsolescing languages. First, variability may develop in the application of

phonological rules; rules that used to be obligatory may apply optionally, show substitutions, or simply be lost. The case of optional rule application usually results in free variation between forms that have resulted from the rule and those that have escaped it. Second, phonological rules may be undergeneralized or overgeneralized.

Considering the consonant cluster reduction in the Kurmanji language, it is apparent from the results that the phonological rule of using initial consonant cluster fricative+glide in Kurmanji language is simply lost.

A phonological category is transferred when one phonological category is adopted and implemented into a lexical item as a form of lexical diffusion until it completely replaces the previously existing category. Approximation represents an underlying path of gradient, subphonemic variation. Conversely, transfer assumes that the sound change was a categorical shift or an articulatory leap.

A sudden categorical shift in /w/ deletion suggest that not all sound changes in obsolescing languages are the consummation of subphonemic variation resulting in the approximation of two sounds. The path a particular sound change takes may depend on the phonological system of the contact language. The reduction of the initial consonant cluster in Kurmanji by which the phonological rule was lost by the younger generation resulted in the application of perceptually and articulatory the phonological rule from the dominant Persian. From the description seen here, it can be generalized that when phonological categories in obsolescing languages are more marked and the phonological rule does not occur in the dominant language, they may experience transfer-like sound changes. Following Babel (2008) the contrasts like phonological contrasts (i.e. /xw-/→/x-/ that are more categorical in nature are more likely to undergo sound change via transfer. Labov (1994) additionally asserted that transfer happens more often when one form has acquired a social stigma or prestige, the less prestigious form (/xw-/ in Kurmanji does not occurr in Persian) a typically transfers to the more prestigious form used in the dominant standard language (Persian). These findings support the assertion made in (Campbell and Muntzel, 1989) in which the authors mentioned examples of previously obligatory rules becoming optional in obsolescence and resulting in free variation. This situation fits well

into the notion of an obsolescing language being imperfectly learned in that it is subtractive: a language structure is forgotten or omitted.

Considering the fact that phonological distinctions with a low functional load are lost prior to those with a high functional load (Andersen, 1982, Campbell and Muntzel, 1989, Babel, 2009) offers two feasible approaches to the investigation of sound change in the present study. This point of view emphasizes the effect of the phonological structure of the dominant Persian as the causal factor in the loss of oppositions in Kurmanji (external motivation); the markedness view, on the other hand, suggest that the marked nature (unnaturalness due to the difficulty of pronunciation) may contribute to its merger with the unmarked feature. Thus the phonotactic constraints of the consonant clusters in the onset of syllable structure in dominant Persian by which initial consonant cluster is not employed and the tendency to reduce markedness conceivably could have worked in concert, jointly leading to the loss in Kurmanji and through convergence with Persian. These findings support the assertion made in Campbell and Muntzel (1989) in which the authors predict that the variability in production increases as a function of the level of language obsolescence.

Chapter Five

Phonetic and Phonological System Interaction

Chapter 5: Phonetic and Phonological system interaction

1. Societal bilingualism: Linguistic outcomes of language contact

Language change may occur at all levels of the system, i.e. syntax, morphology, phonology, semantics, lexicon and phonetics/speech. However, with respect to contact-induced change, many linguists recognize that there are differences in stability from one component (or level) to another; that is; some levels are more permeable to contact-induced change than others (Coetsem 2000, Thomason & Kaufman 1988, Weinreich 1968). This claim, however, has not gone unchallenged. Regarding contact-induced change, many frameworks have been proposed over the years. As Coetsem (2000) points out, there is no widely recognized model for the study of language contact. For instance, Thomason & Kaufman (1988)'s framework differs from others in the explanatory weight placed on sociolinguistic forces:

> "The starting point for our theory of linguistic interference is this: it is the sociolinguistic history of the speakers, and not the structure of their language, that is the primary determinant of the linguistic outcome of language contact. Purely linguistic considerations are relevant but strictly secondary overall" (Thomason & Kaufman 1988: 35).

Specifically, Thomason & Kaufman (1988) claimed, provided that some sociolinguistic factors are met, "any linguistic feature can be transferred from any

language to any other language" (p.14). This view has been challenged by, among others, Silva Corval´an (1994), who claims that "only those (linguistic features) that are compatible ... with the structure of the borrowing language ... will be adopted, disseminated, and passed on to new generations" (p.134). Coetsem (2000) also argues that there are clear stability differences among the different grammar components such as morphology, syntax or phonology:

> "Researching language contact without considering the stability gradient of language is a futile undertaking. The stability factor in language contact is a marker of transferability of language material from one language to another" (Coetsem 2000: 32).

The relevance of the 'stability gradient of language' becomes important when we consider the two types of cross-linguistic transfer that have been commonly claimed to be present in language contact situations. Coetsem (2000), as well as Thomason & Kaufman (1988) and others, makes a difference between two types of cross-linguistic transfer: Substratum interference, i.e. L1-to-L2 transfer, and borrowing, i.e. L2-to-L1 transfer.

Coetsem (2000) emphasizes this distinction and refers to these two transfer types with the following terms: 'borrowing' (or RLA: Recipient Language Agentivity) and 'imposition' (or SLA: Source Language Agentivity). Imposition is equivalent to substratum interference, or what second language acquisition researchers know as 'transfer'. Transfer, for Coetsem, is a neutral term that refers to the adoption of features from one language to another; that is, any kind of cross-linguistic influence. According to Coetsem (2000) all cases of contact-induced change involve the transfer of features from a source language (SL) to a recipient language (RL).

The direction of transfer is always the same, from the SL to the RL. However, the agentivity of the innovation, i.e. the social group that initiates the change, can either be the source language speakers (SL agentivity, imposition, substratum interference) or the recipient language speakers (RL agentivity, borrowing). This dichotomy crucially depends on an understanding of what counts as a source language or a recipient language speaker. Coetsem argues that the difference between these two speaker groups lies in the

psycholinguistic notion of language dominance, i.e. he observes that many bilinguals are dominant in one of the two (or more) languages they speak. Many times, speakers are dominant in their native language or mother tongue, but this is by no means necessary. The frequency of use of a given language can help determine psycholinguistic dominance (Flege et al., 2002), for instance. In summary, in SL Agentivity or imposition, speakers that are dominant in the SL impose the features of their dominant language (L1) into their non-dominant language (L2). On the other hand, in RL Agentivity, speakers that are dominant in the RL adopt features from their non-dominant language (L2) into their dominant language (L1).

It is important to highlight the difference between psycholinguistic language dominance and social or sociopolitical language dominance. When Coetsem uses the term 'language dominance', he is referring to "the fact that a speaker is more proficient in one of the languages involved in contact, which is typically his first or primary language" (Winford 2003: 377).

Social factors may have an effect on how many speakers, or which groups of speakers, will be dominant in one language or the other. However, it is the psycholinguistic dominance factors that will be responsible for the actual types of transfer taking place in a given language contact situation. In other words, psycholinguistic dominance will be responsible for generating innovations, and thus initiating changes, but not for spreading these innovations throughout the entire speech community.

In the study of language change, a separation between innovation, adoption and diffusion has traditionally been made (Weinreich et al. 1968, Labov 2001). Innovation is the introduction of a new feature in the speech of a small group of individuals. Adoption refers to the imitation of this new feature by other groups of speakers. Finally, diffusion is the spreading of this new feature to a wider speech community or even the community as a whole. Coetsem's theory has, from our point of view, very little to say about diffusion, but it has great explanatory potential for an account of innovation and early adoption of new features in language contact situations. Winford (2003) and Coetsem (2000)'s point is that a careful account of the linguistic outcomes and processes of

language contact can only come from an understanding of the psycholinguistic dominance patterns of the innovators. The claim thus is that the locus of change lies within the individual speaker, in this case, the bilingual individual (Milroy 2002, Weinreich 1968). Social factors will then be responsible for spreading (or not) the innovations across the speech community. The innovative feature may rapidly be adopted by other speakers with a similar or equivalent psycholinguistic dominance patterns. Furthermore, since the locus of change is claimed to lie within the bilingual individual, psycholinguistic research on language processing and competence in bilinguals may allow us to make predictions about what types of change are possible or more common in specific contact situations, and to rule out those that will not be attested. Coetsem (2000)'s framework invites researchers to investigate speech patterns of a wide speech community without obviating the study of individual bilinguals. It invites researchers to consider the two languages and the agents of innovation in the study of contact-induced change.

In sum, many theoretical frameworks for language contact research distinguish between substratum interference and borrowing processes (Coetsem 2000, Thomason & Kaufman 1988, Weinreich 1968). Coetsem's model differs from others in that it bases this dichotomy on the role of the agents in the first steps of a change, innovation. For Coetsem, borrowing is a type of cross-linguistic transfer that has been triggered by a group of speakers that adopted features from their L2 into their L1; while substratum interference (imposition) is a contact-induced change initiated by a group of speakers that transplanted patterns from their L1 into their L2. This distinction is important because bilingualism research has shown that patterns of L1-to-L2 transfer in individual bilinguals are fundamentally different from L2-to-L1 patterns of transfer, also within individuals (e.g. Grosjean 1982). The two types of transfer, as well as the potential (un)balance of the two languages (in a two-way contact situation) by different groups of speakers, need to be addressed in an investigation of contact-induced change.

2. The significance of the dialect loss

With good reason, linguists are concerned about the moribund status of a majority of the world's languages (e.g. Dorian 1989, Hale et al. 1992, Grenoble & Whaley 1998a). At the same time, the decline of a significant number of the world's languages allows language researchers to examine the nature of language recession and loss (e.g. Dorian 1981, Campbell & Muntzel 1989, Campbell 1994).

Despite increasing interest in endangered languages and language varieties in bilingual contact situations, few linguists have investigated language varieties whose unique status is threatened by encroaching varieties of the same language. The exclusion of moribund dialects of 'safe' languages from the endangerment direction seems to rest on a questionable set of assumptions, which may be summarized as follows:

- That the distinction between language and dialect is sufficiently well defined and discrete to enable researchers to make principled decisions about which varieties of language should and should not be included in the endangerment direction.
- That the death of a language variety in a bilingual context is a loss more significant than the death of a language variety in a bi-dialectal one.
- That intra-language variation is less significant than inter-language variation for understanding the interplay of diversity and universality in the organization of language.
- That dialect recession in an intra-language context is less significant in the formulation of models of language change and attrition than language recession in inter-language contexts.
- That the loss of cultural identity and intellectual diversity surrounding dialect loss is not nearly as significant as that surrounding the loss of a language.

In this dissertation, I have challenged the above assumptions and demonstrated through detailed investigation of the endangered dialect community of Khorasani variety of Kurmanji, Northeast of Iran that a dialect of a ‘safe’ language ought to be included in the endangerment direction. The study of moribund dialects provides important insight into the patterning of language and language variation. Dying dialects of even languages

as alive as English reveal features not found in more mainstream varieties, and these structures need to be documented in order to provide a full representation of diversity within language. Further, the examination of obsolescing forms in moribund dialects may contribute to our understanding of the processes of language recession.

Studies of language endangerment and death focus on situations in which minority languages exhibit structural decay as they are supplanted by majority languages (Dorian 1981, 1989, Trudgill 1983, Dressler 1981).

According to Cook (1989:235), the most consistently reported phenomena reported for dying languages are "(a) structural (and stylistic) simplifications and (b) dramatic increases of variability due to incongruent and idiosyncratic 'change'." And in some instances, language decay and language death are simply assumed to be "inextricably linked" (Dressler 1981).

Investigations of the moribund Khorasani variety of Kurmanji also support, for the most part, a dissipation model of language recession, in which distinguishing dialect features are lost or drastically eroded. However, the investigation of the Khorasani variety of Kurmanji shows that dissipation is not the inevitable result when this variety comes into contact with other languages. As Khorasani Kurmanji speakers come into increasing contact with other languages, specifically Persian, they are NOT losing the features of their dialect that serve to distinguish their speech variety from surrounding varieties and from the dominant Persian. Nonetheless, I classify the Khorasani variety of Kurmanji as moribund, since it is rapidly losing speakers as more and more do the younger generations merge into the Persian society resulting in mixed marriage, education and employment, in which the official language of the society is the dominant Persian.

3. Language change and language acquisition

Language change is observed when a generation of speakers produces linguistic expressions that differ from those of previous generations, either in form or in distribution. Language change is explained when its causal forces are identified and their interactions are made clear. At least two components are essential for any causal theory of language change. One component, long recognized by historical linguists, is a theory of language acquisition by child learners: ultimately, language changes because learners acquire different grammars from their parents. In addition, as children become parents, their linguistic expressions constitute the acquisition evidence for the next generation.

4. Internal and external influences in language change

The study of language attrition has generally focused on characterizing how and why changes come about in an obsolescing language vis-à-vis earlier, more robust stages of the language. On the one hand, change may occur as a result of external influence from a dominant language in the community; on the other hand, change may arise due to language-internal dynamics having nothing to do with the dominant language. When change is externally motivated by the influence of a dominant language, the obsolescing language may come to approximate features of the dominant language; conversely, external influence may cause salient features of the obsolescing language not found in the dominant language to be enhanced, thus further differentiating the obsolescing language from the dominant language. In other words, externally motivated change may result in either convergence with or divergence from the dominant language. In a similar way, internally motivated change, by virtue of its independence from the influence of an outside language, introduces features into the obsolescing language that may happen to converge with the dominant language or to diverge from it. Whether or not the change is convergent or divergent then depends upon the nature of the particular languages involved. Though externally motivated change and internally motivated change are often referred to in terms of a dichotomy of opposing categories, logically they are not

mutually exclusive types of change. As Dorian (1993) cautions, it can be difficult to tell whether a particular change in an obsolescing language is due exclusively to external influence from a dominant language, exclusively to language-internal dynamics, or to some combination of external and internal pressures when they would both push the language in the same direction. Furthermore, it is likely for a language to be undergoing changes due to internal pressures at the same time that it is being affected separately by contact with another language; in fact, this confluence of motivations for change "seems to be very common in dying languages" (Thomason 2001: 230).

Given that an obsolescing language may undergo externally motivated changes and internally motivated changes and that both types of change may be convergent or divergent, it stands to reason that it should be possible for an obsolescing language to show both convergent and divergent change with respect to the contact language. Nonetheless, the literature on language attrition has largely focused on cases of either one or the other, rather than on cases of both happening at the same time.

4.1. Language obsolescence and its effects on phonetics and phonology

In a survey of many different documented cases of so-called dying languages, Campbell and Muntzel (1989) develop a typology of language obsolescence and the sorts of change processes that can occur in obsolescing languages. The case of the Khorasani variety of Kurmanji investigated in this study is best described by the situation they call "gradual death", in which a language is eventually lost due to increasing bilingualism in a dominant contact language, which eventually comes to be used in all communicative contexts.

In such an obsolescing language, there are three main patterns to be seen in the types of phonological changes that occur (Andersen 1982: 95). First, fewer phonological distinctions will be made overall than at more viable stages of the language. Second, phonological distinctions common to the obsolescing language and the dominant contact language will be preserved. Finally, phonological distinctions with a high functional load

will be maintained longer than those with a low functional load. Although the second and third patterns have to do with the preservation of structure, the first constitutes a loss of structure. In this respect, the type of change instantiating this pattern will most often be convergent with the dominant contact language, since the structure lost is usually one not found in the contact language; through the loss of structure particular to the obsolescing language, the obsolescing language becomes more similar to the contact language.

4.1.1. Convergent change: Overgeneralization of unmarked features

Citing much of Campbell's previous work in this area, Campbell and Muntzel (1989: 186-187) describe many cases of convergent phonological change. One instance is the language Pipil (Southern Uto-Aztecan, Aztecan), whose speakers have for the most part neutralized a vowel length contrast not found in the dominant language, Spanish, leaving just short vowels. Campbell and Muntzel (1989) describe these sorts of externally motivated changes as predictable or expected. What they have in common is the loss of structures in the obsolescing language that are not present in the dominant language. Campbell and Muntzel also enumerate several other categories of phonological change that they describe as "of uncertain predictability". Two of these are (1) the overgeneralization of unmarked features and (2) the overgeneralization of marked features.

The overgeneralization of unmarked features can result in the types of convergent change cited above for Pipil. Short segments are indeed less marked than long segments. The internal effect of unmarkedness/naturalness and the external effect of a dominant language on the loss of structure are therefore indistinguishable when the structure lost is a marked structure present in the obsolescing language and absent from the dominant language. Either or both of these effects may be responsible for the apparently convergent change.

In Chapter 3, I considered both internal and external evidence for the relative unmarkedness of voiceless aspirated stops vis-à-vis voiced stops and plain voiceless stops.

The strongest internal evidence comes from phonological distributions, such as the elsewhere status of aspiration in Kurmanji voiceless stops, and from neutralization in the first and second language phonological systems. External evidence for the relative unmarkedness of aspiration is ample; I have considered a number of relevant cases from language change. Closer examination of phonological and phonetic evidence suggests that the unmarked/more learnable two-way laryngeal opposition is between unaspirated and aspirated stops with the boundary between the two set at the (long-lag) value in Kurmanji. These findings in particular show that comparative evidence of Kurmanji and the dominant Persian heightens the probability that the internally motivated and externally motivated changes may occur alongside each other, even affecting the same part of the phonemic inventory.

VOT values in Kurmanji exhibited the expected pattern of drift from short lag to long lag VOT with the significant increase occurring between Generation1 and Generation2. This is likely because Generation2 speakers in northeast of Iran do not form a cohesive Kurmanji community compared to Generation1 and therefore have no opportunity to talk casually outside home, thus, they merge into the dominant Persian and the VOT values of Generation2 speakers are rapidly pulled through the VOT values of the dominant Persian (Zirak and Skaer 2013a).

Given that both structural and sonority-based markedness are assumed to be a cross-linguistic phenomenon, it is predicted that such implicational relationships between onset cluster types will hold across language change. Returning to the study of Consonant cluster reduction in Kurmanji reflexive pronouns in Chapter 4, the results in this study illustrated that Kurmanji's phonological system in Generation2 simplified all initial consonant clusters, including consonant+glide sequences, generally to singletons. Following the assumption that consonant+glide sequences are complex onsets in Kurmanji, my analysis of Kurmanji clusters established the most marked complex onsets of the Kurmanji language, compared to the dominant Persian which does not allow the onset clusters, to be the fricative+glide sequences in onset, as in the reflexive pronoun [xwa] ''self''.

Thus, it appears that structural and sonority-based principles of syllable markedness also are supported in research with language change. These findings are not unexpected, given that these types of markedness are presumably cross-linguistic phenomena; nevertheless, there still is a need for additional evidence to support these findings. Should we observe that this prediction is not held, this would require a reconsideration of the universality of structural and featural markedness.

Thus, the generalization from clusters to singletons that has been documented in previous studies appears to have occurred in Kurmanji reflexive pronoun /xwa/. As such, the findings show preliminary support for markedness predictions. The introduction of a relatively marked cluster into the speaker's sound system appears to have led to improvements on the relatively unmarked tap singleton. In fact, the speaker showed higher tendency on the unmarked singleton as compared to the marked cluster, despite the fact that the cluster was targeted in the study.

4.1.2. Transfer and approximation in phonological merger

Trudgill and Foxcroft (1978) introduce the concepts of transfer and approximation in their analysis of vowel mergers in East Anglia. In the case of transfer, two phonemes merge via the first phoneme categorically changing to the second phoneme in more and more words containing the former phoneme; in this case, the merger is accomplished by the unidirectional transfer of one phoneme to another in a process that "involves…a form of lexical diffusion" (Trudgill and Foxcroft 1978: 73), which is "not consistent with a result that shows an intermediate phonetic form" (Labov 1994: 321). In the case of approximation, however, two phonemes merge as their individual phonetic spaces approach (i.e. approximate) each other; here both phonemes typically shift, resulting in a merged category with a phonetic space intermediate between the original phonemes. According to Labov (ibid.), approximation may also result in a merged phoneme with approximately the same phonetic space as one of the original phonemes; similar to transfer, then, the final result in this sort of approximation is not an intermediate phonetic

form. In addition to these two merger types, Labov (1994: 321-323) adds a third type, expansion, in which the phonetic space of the merged category, rather than being intermediate between the original categories or coincident with one of them, spans the phonetic spaces of both. These categories of merger figure prominently in an extensive acoustic and articulatory study of Northern Paiute (Uto-Aztecan, Western Numic) carried out by Babel (2007), who documents two kinds of sound change in the language. First, a three-way laryngeal contrast is maintained in each of three generations of speakers; however, the phonetic realization of this contrast differs across generations, and in the youngest generation there is increased subphonemic variation. Second, the place of articulation of the language's sibilant shifts from a palatalized post-alveolar to a plain alveolar (i.e. English /s/), while a more palatalized allophone is replaced by the English palato-alveolar /ʃ/ in the youngest generation. Based upon these results, Babel hypothesizes that contrasts based on timing relationships (e.g. laryngeal contrasts) are more likely to undergo sound change via approximation, while contrasts that are more categorical in nature (e.g. consonantal place contrasts) are more likely to undergo sound change via transfer. Labov (1994: 321) additionally asserts that transfer happens more often when "one form has acquired a social stigma or prestige", the less prestigious form typically transferring to the more prestigious form used in the dominant standard language. This terminology will be adopted below in the discussion of sound change in Kurmanji.

Kurmanji VOT exhibited the expected pattern of drift from short-lag to long-lag VOT, with the biggest increase occurring between Generation1 and Generation2. This is likely because Generation2 speakers in the region do not form a cohesive Kurmanji community and therefore have little opportunity to talk casually in Kurmanji outside the home. In contrast, an active Persian community creates ample opportunity for casual speech with younger generations. Thus the VOT of Generation2 speakers is more rapidly pulled towards the dominant community norms. However Generation1 and Generation2 Kurmanji continue to value their language and heritage, illustrated by the Kurmanji's cross-generational gradual change (Zirak and Skaer 2013b).

Considering the fact that speakers of an obsolescing language are expected to make fewer phonological distinctions, yet maintain distinctions in the obsolescing language that also exist in the dominant language, and phonological distinctions with a low functional load are to be lost prior to those with a high functional load offer two feasible approaches to the investigation of sound change in the evidence of VOT distinction in Kurmanji. This point of view emphasizes the effect of the phonological structure of the dominant Persian as the causal factor in the loss of oppositions in Kurmanji (external motivation): There is no similar contrast in voiceless initial stops in Persian consequently; this contrast in Kurmanji is left more vulnerable to loss. This contrast is in fact maintained in Generation2, the distance between categories simply decrease. The markedness view, on the other hand, suggests that the marked nature may contribute to its merger with the unmarked feature: Considering the voiceless aspirates as less marked than plain voiceless stops and the fact that aspiration contrasts are less marked than voicing contrasts, plain voiceless stops in Kurmanji tend to change to aspirated voiceless stops.

Acoustic correlates of the voicing distinction showed that the voicing contrast can be viewed as a three way distinction in the timing of vocal fold vibration. Subtle changes in these timing relationships cause increasingly gradient subphonemic effects in younger generations compared to older generations. It can be predicted that phonological changes in obsolescing languages that rely on specific timing relationships, like the narrowing of the aspirated/unaspirated contrast in younger generations of Kurmanji speakers suggest that later generations of Kurmanji speakers may not necessarily lose contrasts, but may exhibit approximation-like sound changes, not categorical phonological transfer.

The findings from the investigated the consonant cluster reduction in Kurmanji in chapter 4 show that comparative evidence of Kurmanji and the dominant Persian heightens the probability of the internally motivated and externally motivated changes may occur alongside each other, even affecting the same part of the phonemic inventory. Formant transitions proved useful in discriminating between the fricative+glide clusters (xw-) and the fricative (x-) alone, and in distinguishing degrees of rounding after the

consonant clusters in Generation1 and Generation2. The consonant cluster /xw-/ reduced to the singleton cluster /x-/, a more likely path to the change involves transfer where /x-/ was incorporated into Kurmanji speakers' system during a period of heavy Persian use or during their concurrent acquisition of the two languages as a child.

The formant analysis of the vowel following the consonant cluster displayed no trace of /w/ in younger generation of Kurmanji speakers. This result shows the reduction of /xw-/ to /x-/ in the onset of Kurmanji syllables and indicates the categorical shift to the Persian category in which consonant clusters in the onset are not employed. Considering the consonant cluster reduction in Kurmanji, it is apparent from the results that the phonological rule of using initial consonant cluster fricative+glide in Kurmanji language is simply lost.

A phonological category is transferred when one phonological category is adopted and implemented into a lexical item as a form of lexical diffusion until it completely replaces the previously existing category. Approximation represents an underlying path of gradient, subphonemic variation. Conversely, transfer assumes that the sound change was a categorical shift or an articulatory leap. This terminology will be adopted in the discussion of sound change in Kurmanji. A sudden categorical shift in /w/ deletion suggest that not all sound changes in obsolescing languages are the consummation of subphonemic variation resulting in the approximation of two sounds. The path a particular sound change takes may depend on the phonological system of the contact language. The description of reducing the initial consonant cluster in Kurmanji by which the phonological rule was lost by the younger generation results in the application of perceptually and articulatory features of the phonological rule of the dominant Persian. From the description seen here, it can be generalized that when phonological categories in obsolescing languages are more marked and the phonological rule does not occur in the dominant language, phonological categories may experience transfer-like sound changes. Labov (1994) additionally asserted that transfer happens more often when "one form has acquired a social stigma or prestige", the less prestigious form (/xw-/ in Kurmanji does not occurr in Persian) typically transferring to the more prestigious form

used in the dominant standard language (Persian). These findings support the assertion made in (Campbell and Muntzel, 1989) in which the authors mentioned examples of previously obligatory rules becoming optional in obsolescence and resulting in free variation. This situation fits well into the notion of an obsolescing language being imperfectly learned in that it is subtractive: a language structure is forgotten or omitted.

Considering the fact that speakers of an obsolescing language are expected to make fewer phonological distinctions, yet maintain distinctions in the endangered language that also exist in the dominant language, and phonological distinctions with a low functional load are to be lost prior to those with a high functional load (Andersen, 1982, Campbell and Muntzel, 1989, Babel, 2009) offers two feasible approaches to the investigation of sound change in Khorasani variety of Kurmanji. This point of view emphasizes the effect of the phonological structure of the Persian dominant as the causal factor in the loss of oppositions in Kurmanji (external motivation); the markedness view, on the other hand, suggests that the marked nature (unnaturalness due to the difficulty of pronunciation) may contribute to its merger with the unmarked feature. Thus the lack of aspirated/unaspirated distinctions and the phonotactic constraints of the consonant clusters in the onset of syllable structure in dominant Persian and the tendency to reduce markedness conceivably could have worked in concert, jointly leading to the loss in Kurmanji and through convergence with Persian. These findings support the assertion made in Campbell and Muntzel (1989) in which the authors predict that the variability in production increases as a function of the level of language obsolescence.

Variability is one of the defining characteristics of human speech. No two voices are identical, no two utterances the same. Variability in speech is not, however, wholly random or chaotic. Rather, it results from a number of specific sources and may form rule-governed patterns. While literature shows that universal features of variability have been studied extensively in phonetics and phonology, language specific features have been the subject of rather less attention. ‘Sociophonetic’ variation is a case in point. This term is one that has come to be used extensively in the last few years, referring usually to

variation in speech that correlates with social factors like speaker gender, age, or social class.

There are several reasons why sociophonetic factors have remained peripheral to phonetics and phonology. Above all, the dominance of particular theoretical models and methodological traditions has meant that social factors have been partitioned de facto from the 'purely linguistic'. The emphasis in the generative tradition, e.g., has been on describing the linguistic knowledge of the ''ideal speaker–listener, in a completely homogeneous speech community'' (Chomsky, 1965, p. 3). Differences between speakers of a given language have thus been less of a concern.

In this section, my aim is to assess the potential for sociophonetic variation to inform theoretical modeling in phonetics and phonology. I begin with an exploration of what is meant by 'sociophonetics' and 'sociophonetic variation', since these terms have not been particularly well defined. I also offer several illustrations of sociophonetic variation, drawing especially on the findings of my own research on Khorasani variety of Kurmanji. In particular, I question whether the marginalization of sociophonetic factors is sustainable in the construction of a comprehensive account of the long-term storage of information about sounds and sound structure, and how that information is accessed in the processes of sound change. I suggest that the interaction between socially determined factors and the variations determined by biology, enabling speakers to use phonetic variation as a resource to achieve a range of social goals. This interaction is the most promising candidate for offering a unified account of how sociophonetic variation might affect the loss of oppositions in an obsolescing language.

5. Sociophonetics

Sociophonetics, the interface between sociolinguistics and phonetics, and specifically the use of modern phonetic methods in quantitative analysis of language variation and change, has grown rapidly in visibility and influence over the past decade. Although its definition can be quite broad, including any sociolinguistic study involving

sounds analyzed impressionistically, it usually implies the use of instrumental techniques. It has expanded from its initial purview in vowel quality to prosody, consonantal quality, and, incipiently, voice quality.

The boundaries of the discipline have become increasingly porous, such that sociophonetic research now amalgamates theories and methods not only from phonetics and sociolinguistics but also from related fields including psycholinguistics, clinical linguistics, first language (L1) and second language (L2) acquisition, theoretical phonology, and computational linguistics. In Foulkes et al.'s (2010) view, the unifying theme of sociophonetic work is the aim of identifying, and ultimately explaining, the sources, loci, parameters, and communicative functions of socially structured variation in speech. In this view the goals of sociophonetics include accounting for how socially structured variation in the sound system is learned, stored cognitively, subjectively evaluated, and processed in speaking and listening. Such work contributes to the development of theoretical models in phonetics and sociolinguistics, spanning speech production and perception, with a clear focus on the origin and spread of change. Sociophonetic methods and data also contribute to theoretical models in phonology, acquisition, and long-term storage of linguistic knowledge, because of the field's focus on fine phonetic detail, and structured variation.

5.1. Sociophonetic variation

Given the diverse fields of reference of sociophonetics, it is important to specify precisely what is meant by sociophonetic variation. According to Foulkes and Docherty (2005), it refers to variable aspects of phonetic or phonological structure in which alternative forms correlate with social factors. "These factors include most obviously those social categories which have been examined extensively by sociolinguists and dialectologists: speaker gender, age, ethnicity, social class, group affiliations, geographical origin, and speaking style." Correlation may be with more than one social category simultaneously, and variation may be observable within the repertoire of an individual speaker or across groups of speakers.

Methodologically, socially structured variation offers great opportunities for experimental phoneticians to exploit, because micro-typological studies fall neatly between cross-linguistic and idiolexical comparisons. The fine granularity of the differences between related socially located linguistic systems provides an invaluable research tool, albeit one which has to date largely been exploited in cross-dialectal research defined geographically rather than socially. Phonetic research often draws on homogeneous pools of subjects to suppress variation, but inter-subject differences in fine phonetic detail which function socially can be used in order to understand both the variation and the aspects which are common across closely related systems, by using structured pools of subjects. Much sociolinguistic work since the 1960s, informed by theoretical advances from adjacent fields such as sociology and anthropology, has been devoted to refining our understanding of the relevant social sources of variation. One important result of such work has been a move beyond broad demographic categories in both methodology and theorizing. I offer below a brief review of some important advances in the understanding of the main sources of learned variability.

Age and intergenerational differences are obviously important contributors to phonetic and linguistic differences through childhood (Vihman, 1996) and again in later life. However, age differences may also reflect socially determined divisions of the age continuum, or life stages. In childhood, lifestyle is dominated by the family setting. Children receive the bulk of their linguistic input from the immediate family and they conform broadly to the norms of the input model(s). Through childhood and into adolescence the social role of the peer group begins to take over. Linguistically, the adolescent period is frequently characterized by a shift away from the family model in favor of high usage of nonstandard forms, high usage of forms that are innovative in any ongoing sound change, and homogeneity of usage across the dominant group (Kerswill & Williams, 2000).

In addition to the social dimensions of variation we should also comment on studies of regional variation, since speech also indicates a person's geographical identity. Regional studies have a particularly long history, and in fact, from the perspective of our

definition of sociophonetics, it is possible to regard the pioneers of nineteenth-century dialectology as the first sociophoneticians (e.g., Wenker, 1895). Their work not only yielded descriptive documentation of geographical variation, it also showed awareness of the social variation within communities through the predominant focus on older rural males as the harbingers of maximally archaic forms, as well as a recognition that traditional dialects were undergoing change through processes such as standardization (Chambers & Trudgill, 1998). Contemporary analyses of regional variation operate with more complex notions of space which acknowledge "distance" between locations as having social and psychological dimensions rather than being defined solely in terms of geographical proximity (Britain, 2002). Such factors may include political boundaries and differing orientations towards larger economic centers (e.g., Boberg, 2000; Woolhiser, 2005; Llamas, 2007). Ethnicity is a social product as opposed to a biological given (Fought, 2002) and indeed can be entirely nonbiological if based on religion or culture. Both ethnic marking in L1 and the role of ethnicity in creating an L2 variety have been examined only from the sociolinguistic view.

In the majority of cases, sociophonetic variation is gradient rather than categorical. That is, variation may be observed such that a given form is used statistically more by one social group than another, or more in one speech style than another. This is the case, for example, with the pronunciation of postvocalic /r/ in some varieties of American English. For example, Labov (1966) showed that in New York City /r/ can either be realized as a rhotic approximant (usually [a]) or it can be given a zero realization, with rates of [a] production correlating with socioeconomic class measures: higher social groups use more [a] than lower social groups.

For example quantitative distributions of voiceless aspirated stops in Khorasani variety of Kurmanji /T^h/ as well as the reduced initial cluster /x-/ therefore may be an indicator of social power of the dominant Persian as well as several social categories correlated simultaneously. In some cases, including that just described of Kurmanji /T^h/ and /x-/, the category indicated is one that is wholly the product of social construction. Thus, the relationship between linguistic form and social category is arbitrary, and

sociophonetic variation represents a pattern of behavior learned by speakers through the experience of using language in social interaction (Foulkes and Docherty 2005).

Correlations between linguistic forms and social factors can be found at all levels of structure, including syntax, morphology, and lexicon. In phonetics and phonology, this includes variation at the segmental, suprasegmental, and subsegmental levels. Foulkes and Docherty (2005) review examples of sociophonetic variation in order to illustrate both its complexity and its pervasiveness which is displayed below:

5.1.1. Segmental variation

From the segmental point of view, socially influenced variation can be found at various levels: the phonemic system, phonotactic distribution and lexical incidence of phonemes and allophones, and segmental realization (Wells, 1982; Foulkes & Docherty, 2006). Such differences may be evident across dialects of a language, therefore indexing regional background, and they may also contribute to stylistic differences when speakers shift, for instance, from more to less standard varieties. They may also be subject to variation and change within a community, and thus become associated with subgroups.

Sociophonetic variation has been documented most extensively in terms of segmental phonetic categories. Wells (1982) establishes four main types of segmental variation for describing differences between accents of English. These can be extended to provide a useful taxonomy of sociophonetic variation more broadly.

First, differences may be SYSTEMIC. That is, there may be variation in the composition of the phoneme inventory. Kurmanji, for example, has the systematic variation in the voice onset time (VOT) values for the two types of Kurmanji voiceless initial stops, i.e. /p, t, k/ and /p^h, t^h, k^h/, which are not found in the dominant Persian (as discussed in chapter 3). Systemic differences are not wholly defined on a regional basis, however; social factors may also play a role. For instance, in Kurmanji initial voiceless unaspirated stops /T/ are receding in frequency and being replaced by initial voiceless aspirated stops /T^h/. The relative frequency of /T/ and /T^h/ is therefore indicative of age

since older speakers in Generation1 use them more often than younger speakers in Generation2.

A second category of difference concerns the PHONOTACTIC DISTRIBUTION of phonemes. English /r/ is a well-known example. The contextual distribution of /r/ differs across varieties in which, variation may index social factors such as class.

Wells' third category concerns the LEXICAL DISTRIBUTION of phonemes. Accents may differ in which phoneme is used in a given lexical item. The choice of variability for example in vowels in terms of which is used in different word, may therefore indicate style as well as geographical origin.

5.1.2. Suprasegmental variation

On the discussion of suprasegmental variation, Foulkes and Docherty (2005) noted that structured variation has also been found in analysis of suprasegmental features. "Intonation patterns, for example, may show regional variation. While most varieties of English use falling contours to mark declarative statements, in some regional dialects rising or high level contours are used instead." These include the traditional dialects of Newcastle, Liverpool, and most of Ireland (Cruttenden 1997, Douglas- Cowie, Cowie, & Rahilly 1995, Knowles 1978, Local, Kelly, & Wells 1986).

Similar regional and social differences have been found with other suprasegmental features (Foulkes and Docherty 2005) including pitch accent realization (Grabe, Post, Nolan, & Farrar 2000), tonal alignment (Nolan & Farrar 1999), voice quality and vocal setting (Esling 1991, Henton & Bladon 1988, Stuart-Smith 1999), rhythm (Deterding 2001, Low, Grabe, & Nolan 2000), and stress placement (Wells 1995).

5.1.3. Subsegmental variation

The predominance of auditory analysis has led to sociophonetic variation being cast most commonly as an alternation between segmental categories. However, instrumental techniques have demonstrated that sociophonetic variation can also be

manifested in fine-grained subsegmental aspects of speech, in terms of the relative duration, strength or temporal coordination of articulatory gestures.

Nolan and Kerswill (1990), for example, investigated a range of connected speech processes including consonantal place assimilations at word boundaries. They found that assimilation rates differed significantly across their speaker sample. Children from the lower status school produced more assimilated forms than did those from the higher status schools. Similar subsegmental patterns have been reported in several other studies, showing that subtle phonetic variation may indicate regional and/or social categories. Examples include Fourakis and Port (1986), Kerswill and Wright (1990), Di Paolo & Faber (1990), Thomas (2000), Stuart-Smith (1999), and Scobbie (2005).

I have also observed subsegmental sociophonetic variation in my work in Kurmanji. In chapter 4, I described consonant cluster reduction in initial consonant clusters in the reflexive pronoun /xwa/. Based upon the results found over the Kurmanji speakers producing the two variations of reflexive pronoun /xwa/ in two generations, i.e. /xwa/ and /xa/, rounding triggers substantial lowering of the second formant and to a lesser extent the first formant, during the consonant-to-vowel transition in the consonant cluster /xwa/, while there is no formant lowering during the formant transition of fricative to vowel transition in /xa/. F2 values taken during the transitions were significantly lower for the rounded fricatives relative to the unrounded ones. The results in this study illustrated that Kurmanji's phonological system in Generation2 simplified all initial consonant clusters, including consonant+glide sequences, generally to singletons. Following the assumption that consonant+glide sequences are complex onsets in Kurmanji, my analysis of Kurmanji clusters established the most marked complex onsets of the Kurmanji language, comparing to the dominant Persian which does not allow the onset clusters, to be the fricative+glide sequences in onset, as in the reflexive pronoun [xwa] ''self''. Furthermore, gradient levels of using the consonant cluster were observed in Kurmanji, in which the tendency of reducing the consonant cluster in Generation1 and producing the unmarked single cluster /x-/ showing the 43.7% (of the tokens), and most marked fricative+glide clusters showing 56.3% (of the tokens). On the other hand, it appears from

the results of Generation2 that not only the speakers never produced the marked fricative+glide clusters, but also they tend to produce the reflexive pronoun using the variation of /xo/ (57.8%) instead of /xa/ which only 42.2% of the tokens pronounced as /xa/. From the sociolinguistic view, the tendency of producing /xo/ is based on the effect of the dominant Persian in which the reflexive pronoun produced as /xod/ and the speakers in Generation2 affecting from the strong influence of Persian used it as Kurmanji reflexive pronoun by dropping the /d/ in coda and produced it as /xo/.

Sociophonetic data provide a very powerful tool for investigating theoretical models of phonetics because they allow experimental examination of slightly different linguistic systems, while holding many other factors constant, something that is far harder, indeed almost impossible, to achieve in cross-linguistic research (Scobbie, 2007a). A particularly interesting subcase of variation is where the phonetic targets of a group of speakers are scattered in a region of phonetic space that would normally be regarded as extending right through adjacent category spaces. Study of fine variation may be an end in itself, but when the "same" phonological opposition is spread through phonetic space in a socially structured way, we are then able to probe directly the phonetics–phonology interface.

It appears that systematic variation can occur in speech production at all levels of phonetic structure that have been studied in detail in a sociophonetic framework. However, it remains an open question whether certain phonetic or phonological parameters are more or less predisposed to bear the burden of social meaning. Labov (2006) appears sceptical that sociophonetic variation can occur in principle in any domain. It has often been noted, for example, that regional variation in English is largely carried by vowel realization (Wells 1982). By contrast, it has been claimed that features such as lexical stress placement appear to vary rather little across English dialects (Wells 1995).

It is of empirical interest to assess whether patterns of sociophonetic variation are constrained by the phonological system of the language, or by other systematic aspects of variation such as those induced by, for example, prosodic structure. Comparing the effects on variation of both internal (grammatical) and external (social) constraints is

typical in sociolinguistic studies (Tagliamonte, 2006). However, attempts to assess the influence of internal constraints on external ones are relatively rare (Docherty, 2007).

6. Summary

In Sections 1–4 of this chapter, I defined and illustrated language contact and dialect loss, linguistic outcomes of language contact and internal and external forces of language change, highlighting both overgeneralization of unmarked features and also the relatively important role of the dominant language it has played in the development of phonetic and phonological change in minority languages. In Section 4, I outlined a number of ways in which these two categories influence on two phonological variabilities confronting change. In section 5, illustrating sociophonetic variation, I suggested that the interaction between socially determined factors and the phonetic and phonological variations determined by biology, enabling speakers to use phonetic variation as a resource to achieve a range of social goals. This interaction is the most promising candidate for offering a unified account of how sociophonetic variation might affect the loss of oppositions in an obsolescing language.

There is a clear task to be undertaken to establish the scope that speakers across languages have in deploying their phonetic resources as a social factor. It would be valuable, e.g., to understand the extent to which phonetic parameters might be more or less predisposed to act as social indicators across languages. For example (Foulkes and Docherty 2005), while research on variation in English usually identifies vowels as the main locus of sociophonetic differences (e.g., Labov, 1994, 2001; Wells, 1982), in Arabic, by contrast, consonants appear to carry the bulk of social information (e.g., Haeri, 1997). The analysisi of phonetic and phonological variation in the Kurmanji language in this study showed that the consonants appear to carry the social information in Kurmanji.

Reviewing evidence from studies of contact-induced language change from the sociophonetic perspective and unlike the anthropologists' viewpoint claiming that individuals' behavior in the lab need not reflect their behavior in day-to-day life, I suggest that it is the combination of detailed phonetic analysis and ethnographic and

social approaches which holds the key to an integrated understanding of how social factors such as dominant language, intergenerational differences and ethnicity can effect on phonetic variations in an obsolescing language. I suggest that researchers can take steps to ensure that the experimental context resembles to some degree the tasks that individuals might reasonably conduct in a daily basis. In this respect, If participants in the experiments are also participants in the field ethnographies, we will be able to conduct experiments that specifically probe individuals' encoding of particular linguistic and social universes in which they participate on a daily basis.

Chapter Six

Concluding Remarks

Chapter 6: Concluding remarks

1. Summary of research

This dissertation has compared phonetic and phonological features of the Khorasani variety of Kurmanji as a moribund language in northeast of Iran produced by speakers of Generation1 to those produced by Generation2. The differences between the two generations point to possible future language changes, as there are few remaining native speakers of the Khorasani variety of Kurmanji, and the language is likely to deal with gradual change, the loss of language in language-contact situations.

Such situations have an intermediate stage of bilingualism in which the dominant language is employed by an increasing number of individuals and characterized by social factors. As younger generations in a subordinate community shift to the dominant language, fewer children learn the minority language, and often those who do so learn it imperfectly. Most of the differences exhibit characteristics of the gradual shift of a minority language, with a greater frequency of variation, to the dominant language.

This research has made contributions to our understanding of phonetic and phonological change in endangered language contexts both from phonetic and phonological as well as sociophonetic perspectives based upon recordings of two generations of Kurmanji speakers.

It is clear that categorical changes, loss of allophones, and sub-phonemic variation are all characteristics of sound change in obsolescing languages. The extent to which sound changes have occurred in the Kurmanji language of Khorasan was considered through instrumental phonetic investigation in this dissertation. Acoustic correlates of the voicing

distinction showed that the younger generation maintains the phonological patterns of the older generation, but the categories are less distinct. The narrowing of the aspirated/unaspirated contrast in younger generations of Kurmanji speakers suggested that later generations of speakers of the Kurmanji language may not necessarily lose contrasts, but may exhibit increased subphonemic variation, causing the category boundaries to become less discrete. Unlike the findings from voicing distinctions which suggested the approximation of the gestures for the long lag VOTs, the formant analysis of the vowel following the consonant cluster displayed no trace of /w/ in the younger generation of Kurmanji speakers. This result showed the reduction of /xw-/ to /x-/ in the onset of Kurmanji syllables and indicates the categorical shift to the Persian category in which consonant clusters in the onset are not employed.

Considering the fact that speakers of an obsolescing language are expected to make fewer phonological distinctions, yet maintain distinctions in the endangered language that also exist in the dominant language, and phonological distinctions with a low functional load are to be lost prior to those with a high functional load, offers two feasible approaches to the investigation of sound change in the present study. This point of view emphasizes the effect of the phonological structure of the Persian dominant as the causal factor in the loss of oppositions in Kurmanji (external motivation); the markedness view, on the other hand, suggests that the marked nature (unnaturalness due to the difficulty of pronunciation) may contribute to its merger with the unmarked feature. Thus the lack of aspirated/unaspirated distinctions and the phonotactic constraints of the consonant clusters in the onset of syllable structure in dominant Persian and the tendency to reduce markedness conceivably could have worked in concert, jointly leading to the loss in Kurmanji and convergence with Persian. These findings supported the assertion made in Campbell and Muntzel (1989) in which the authors predict that the variability in production increases as a function of the level of language obsolescence.

The last part of the research suggested a new perspective which investigates the relationship between social factors and phonetic and phonological variation, i.e. sociophonetics, in examining variation in sound change. The principles of the sociophonetic dimensions conveyed within the speech signal will be present from an

early stage of phonological acquisition. Assuming that children learn language via input from more than one individual, a child growing up in the Kurmanji community in Khorasan, for example, needs to learn the various forms of voicing distinctions in initial stops i.e. [D:T:T^h] or initial consonant cluster variation /xwa/*vs.*/xa/*vs.*/xo/, all of which are socially differentiated but which have no transparent grounding in biological differences. They are not used by all individuals in these groups, and are more restricted in their frequency of occurrence.

2. Future research

Reviewing evidence from studies of contact-induced language change from the sociophonetic perspective and unlike the anthropologists' viewpoint claiming that individuals' behavior in the lab need not reflect their behavior in day-to-day life, in chapter 6 after concluding the dissertation I suggested that it is the combination of detailed phonetic analysis and ethnographic and social approaches which holds the key to an integrated understanding of how social factors such as intergenerational differences and the dominant language can have an effect on phonetic variations in an obsolescing language. I've suggested that researchers can take steps to ensure that the experimental context resembles to some degree the tasks that individuals might reasonably conduct in a daily basis. In this respect, if participants in the experiments are also participants in the field ethnographies, we will be able to conduct experiments that specifically probe individuals' encoding of particular linguistic and social universes in which they participate on a daily basis.

The following areas would seem to be key lines of investigation for shedding further light on the validity of the sociophonetic perspective by which research to date has not been investigated with a focus on sound change in obsolescing languages.

First, in respect of speech production, we need further work to identify which phonetic parameters can carry social information. There is a clear task to be undertaken to establish the scope that speakers across languages have in deploying their phonetic resources as social information. It would be valuable, e.g., to understand the extent to

which phonetic parameters might be more or less predisposed to act as social indicators across languages. Less work has been devoted to the potential indicating role of subsegmental or suprasegmental sound change across languages. It would also be valuable to investigate further the extent to which sociophonetic variables are correlated within speakers' performance of obsolescing languages through sound change. Most sociolinguistic studies focus on variables independently. Only a few studies have examined the clustering of variables within a community.

Second, inter speaker differences have received too little attention in the phonetics and phonology literature. Similarly, sociolinguistic studies have often tended to gloss over differences between individuals' speech productions by pooling or averaging data for speaker groups. The relevance of individual variation to our understanding of social and communicative aspects of language is, however, being recognized more widely by practitioners in both fields. Neither phoneticians nor sociolinguists have addressed issues of ethnicity and dialect loss to the level of detail given to other factors. However, it is now widely accepted that while factors such as region, class, gender and ethnicity all have an important influence on speech, they do not determine how people speak. The mentioned areas would seem to be important unexplored areas which should be investigated more thoroughly.

It is clear that pursuit of these questions will enhance our understanding of phonological representation and acquisition, speech production and perception, and in particular will allow further testing of aspects of the sociophonetic framework for phonetic and phonological representation through language change in obsolescing languages. Such a recasting of the object of study is certainly a challenge to fields such as phonetics and phonology, which have typically concentrated on generalizations across subjects and which have made assumptions about homogeneity of groups of subjects on the grounds of shared age, sex, and geographical origin. But studies of sociophonetic variability suggest that such an approach is essential if we are to fully understand how social information is channeled alongside linguistic information within spoken communication.

3. Conclusion

Though further research is required to better understand the implication of the sociophonetic perspective, this study provides information about how these perspectives could have jointly worked through sound change in the Khorasani variety of Kurmanji. My hope is that it furthers our understanding of phonetic and phonological change in an endangered language context, both from the perspective of sociophonetic science and from the perspective of the Khorasani variety of Kurmanji as an obsolescing language in Iran.

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