# The phonology of Iranian-Balochi dialects : description and analysis

Soohani, B.

**Author**: Soohani, B.
**Title**: The phonology of Iranian-Balochi dialects : description and analysis
**Issue Date**: 2017-05-18

# The Phonology of Iranian-Balochi Dialects:

# Description and Analysis

Published by
LOT
Trans 10
3512 JK Utrecht
The Netherlands

phone: +31 30 253 6111

e-mail: lot@uu.nl
http://www.lotschool.nl

ISBN: 978-94-6093-243-4

NUR 616

# The Phonology of Iranian-Balochi Dialects:

# Description and Analysis

PROEFSCHRIFT

ter verkrijging van
de graad van Doctor aan de Universiteit Leiden,
op gezag van Rector Magnificus prof.mr. C.J.J.M. Stolker,
volgens besluit van het College voor Promoties
te verdedigen op donderdag 18 mei 2017
klokke 11:15 uur

door

**Bahareh Soohani**

geboren te Tehran, Iran

in 1978

## Promotores

Promotor: Prof.dr. M. Van Oostendoorp

Co-promotor: Dr.A. A. Ahangar (Sistan and Baluchestan University)

## Promotiecommissie

Prof.dr. M. Mous

Prof.dr.B.Hermans (Meertens Instituut, KNAW; Vrije Universiteit)

Dr.B. Köhnlein (The Ohio State University)

چه نزدیک است

جان تو

به جانم

که هرچیزی که اندیشی بدانم

(مولانا)

***To my mother!***

# Table of Contents

# Acknowledgment

I would like to offer my deepest respect and gratitude to my supervisor, Prof. Marc Van Oostendorp, for being a constant source of support, encouragement, and constructive advice.

Special thanks go to Dr. Abbas Ali Ahangar, my external supervisor at the University of Sistan and Baluchestan, Iran, for his help and encouragement he offered me during my work.

I would like to thank all the members of the dissertation committee, for taking time to read the manuscript and for their helpful comments and precise advices, Prof. Maarten Mous, Prof. Ben Hermans and Dr. Bjoern Kohnlein.

Other 'contributors' to this dissertation have been William Carey, Stanly Oomen, Mahdiyeh Abolhasan and Marjoleine Sloos. Indeed, William and Stanly painstackingly went through my thesis reviseing and definitely improving my English writing, for thanks to both of them. Mahdiyeh edited my thesis, my special thanks to her. To my sister Marjoleine, I owe the readability of the samenvatting.

I would also like to thank my great friends for their support during doing my PhD journey: Somayyeh Rostamian, Sima Zolfaghari, Marjoleine Sloos Masumeh Abolhasan, Neda Taheri, Shirin Vaferi, , Stanly Oomen, Edoardo Cavirani, Said Reza Huseini, Sajjad Asghari, Negar Izadi, Setareh Eskandari, Roberta D' Alessandro, Jeroen Van de Weijer and Anneke Donker.

My heartfelt thanks go to my linguistic informants in Sistan and Baluchestan province, whose sincere help and kind participation were crucial to the success of my fieldwork.

I am forever indebted to my parents Zohreh Hemmati and Jahan Motia, for their encouragement, support and help at every stage of my personal and academic life.

Leiden, Spring 2017

# List of abbriviations

| | |
|---|---|
| 1SG | First person singular |
| 2SG | Second person plural |
| 3SG | Third person singular |
| 1PL | First person plura |
| 2PL | Second person plural |
| 3PL | Third person plural |
| C | Coda |
| CON | Constraint |
| EVAL | Evaluation |
| F | Fricative |
| G | Glide |
| GEN | Generator |
| IBD | Iranian Balochi Dialects |
| L | Liquid |
| LB | Lashari Balochi |
| MSB | Mirjaveh Sarhaddi Balochi |
| MSD | Minimal Sonority Distance |
| N | Nasal |
| N | Nucleaus |
| O | Obstruent |
| O | Onset |
| OT | Optimality Theory |
| OCP | Obligatory Contour Principle |
| R | Rhyme |
| S | Stop |
| SB | Sarawani Balochi |
| SSG | Sonority Sequencing Generalization |
| SSP | Sonority Sequencing Principle |
| WSP | Weight to Stress Principle |

# Chapter (1)

## Introduction

The present study deals with the phonological system of three Iranian Balochi dialects namely Mrijaveh Sarhaddi Balochi (MSB), Sarawani Balochi (SB) and Lashari Balochi (LB)”. Those three selected Iranian Balochi dialects (henceforth IBDs) are spoken respectively in Mirjaveh, Sarawan, and Lashar in Sistan and Baluchestan[1] province, which is located in the southeast of Iran. As to the title of the present thesis, both descriptive and theoretical approaches are concerned, since they can complement each other, connecting language (i.e. Balochi) to Language (i.e. universal grammar), and give a formal and precise description and analysis of the grammatical properties of IBDs sounds.

My main concern in the present research is to reveal how speech- sounds are structured and function in IBDs with both descriptive and theoretical approaches. Since only some descriptions and no theoretical studies have been previously done on the phonological system of Balochi, the present study can be regarded as the starting point for doing both descriptive and theoretical studies on the phonological system of Iranian-Balochi dialects.

Every phonological analysis is dependent on theory, the particular theory chosen in the present research to analyze IBDs data is Optimality Theory (OT). Besides my personal interest in this modern theory of phonology, I regard the present study as an opportunity to examine how a constraint-based theory treats the Balochi data. The value of a theory is measured based on its insight and prediction in analyzing language data. However, *The Phonology of Iranian-Balochi Dialects: Description and Analysis* has no ambition to offer innovative and new phonological phenomena, but rather to present and analyze new data for Balochi, as one of the Indo-Iranian languages, from the typological perspective which might be significant for the development of OT principles, and might ultimately help our understanding of what human language is.

Based on the chosen theory (here OT), I characterize and make an inventory of the sounds in IBDs, how the sounds can be combined to form syllable and words, what the stress patterns are like in IBDs, and so on. Moreover, the nature of alternations in IBDs data, that is, the differences in phonological form that we observe in the realization of a morpheme in a different context, is investigated.

This thesis is of interest to descriptive linguists and specialists of OT. The theoretical part is ideally suited for two groups of readers: first those who are interested in learning to do phonology in OT, and those phonologists who are

[1] This is the official English spelling used in Iran; also spelled *Sistan va Baluchestan* (Okati 2012)

experts. OT learners should focus on the parts of the theory which sheds light on the data; experts should concentrate on data which shed light on the theory.

The remainder of this chapter is organized as follows. Section 1.1 is dedicated to the historical survey of the Baloch of Iran. Section 1.2 deals with the Balochi language and its position in the Iranian language family. Section 1.3 will introduce the Balochi dialects. An overview of the previous investigations on Balochi phonological system will be presented in section 1.4. In section 1.5, the methods used for this work will be discussed. Section 1.6 deals with the theoretical considerations. Finally, section 1.7 presents the aims of the present study.

## 1.1 Historical survey of the Baloch of Iran

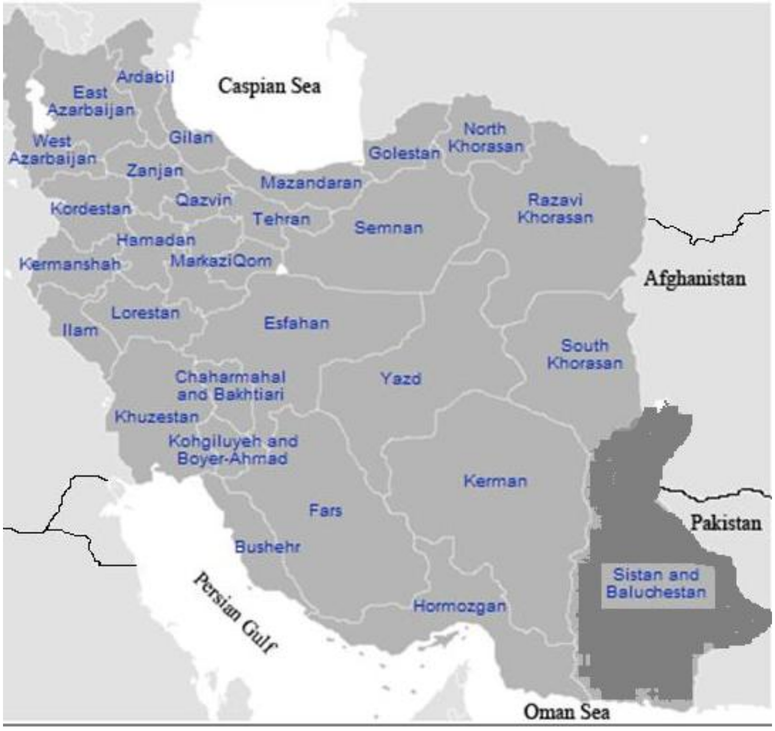
Grierson (1921:327, cited in Barjasteh Delforoz 2010) refers to the original home of the Baloch in the neighborhood of the Caspian Sea, so the north-western part of the Iranian linguistic area was the early homeland of the Baloch, but later they migrated to Kerman and then in 11$^{th}$century A.D., under the pressure of the Seljuq attack, they were forced to move to the south-east part of Iran, to Sistan and Makran.Their present settlements mainly form part of Sistan and Baluchestan province in Iran and Baluchestan province in Pakistan as well.

According to the old historical ballads of the Baloch, which go back to the 16$^{th}$century, the Baloch are Arab in origin from Halab (Aleppo). After fighting on the side of Imam Hussein against the Caliph Yazid at Karbala, they left their homeland for Sistan (Elfenbein 1989:640).

The Baloch migrations may have continued during the next centuries because of different reasons. The last ones happened at the end of the 19$^{th}$ and the beginning of the 20$^{th}$ centuries from Sistan to Turkmenistan (Axenov 2006:19). Immigration also took place at different times during the 20$^{th}$ century from Sistan to Khorasan and Golestan provinces, mostly because of prolonged droughts (Barjasteh Delforooz, 2010:18).

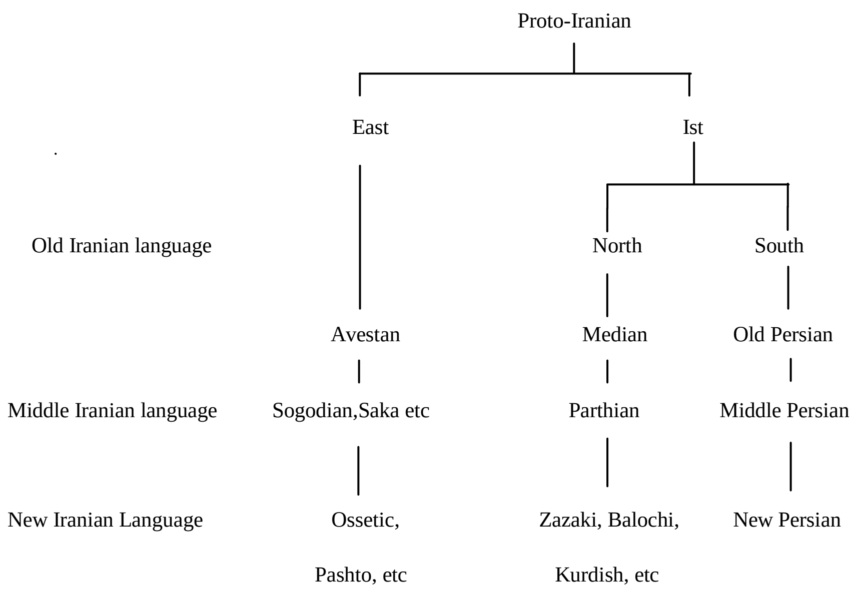
Presently the Sistan and Baluchestan province is the main area for Baloch of Iran. It is located in the southeast of the country, bordering Pakistan and Afghanistan and its capital is Zahedan. The province is the largest in Iran, with an area of 181,785 square km and a population of 2.4 million. Its major cities are Khash, Iranshahr, Sarawan, Zabol, Sooran, Nikshahr and commercial free port of Chabahar on the coast of Gulf of Oman. On the map of Iran (see Map 1), the Sistan and Baluchestan province is highlighted.

Map1: The location of Sistan and Baluchestan Province in the Islamic Republic of Iran




## 1.2 The Balochi language and its position in the Iranian language family

From the historical point of view, the position of Balochi among western Iranian languages is controversial. While Paul (2003:61) claims that Balochi seems to be more a south-western Iranian language, Elfenbein (1989) and Korn (2003) introduce this language among the north-western group of Iranian languages, which also includes other new Iranian languages such as Kurdish, Zazaki, Gilaki, Mazandarani, and Taleshi, whereas Persian, Lori-type languages, etc., are classified as south-western Iranian languages. Geographically, Balochi is spoken in the south-eastern part of the Iranian language area. Korn (2003:50) shows the position of Balochi among other Iranian languages in the form of family tree as below:




## 1.3 Balochi dialects

Balochi has a wide variety of dialects, which are distinguished by various features of their phonology, lexicon, and morphology. Early linguists considered that there are essentially two dialects of Balochi: Northern and Southern dialects. Two distinguished linguists who believed in this dichotomy were Geiger (1889) and Dames (1891). The first linguist who took a different view was Grierson (1921), who proposed a western versus eastern dichotomy. Elfenbein (1966), Barker& Mengal (1969), and Jahani (1989) are among the supporters of the latter classification (cited in Axenov 2006: 21).

The most systematic classification of Balochi dialects has been done by Elfenbein. He presents his results in several articles and books. According to Elfenbein (1989:636-637), Balochi consists of two main groups of dialects, Eastern, and Western, which are divisible into six major dialects:

1) Rakhshani with its three subdialects:

a) Sarhaddi (including Balochi of Sistan and Balochi of Turkmenistan)
b) Panjuri
c) Kalati

2) Sarawani
3) Lashari

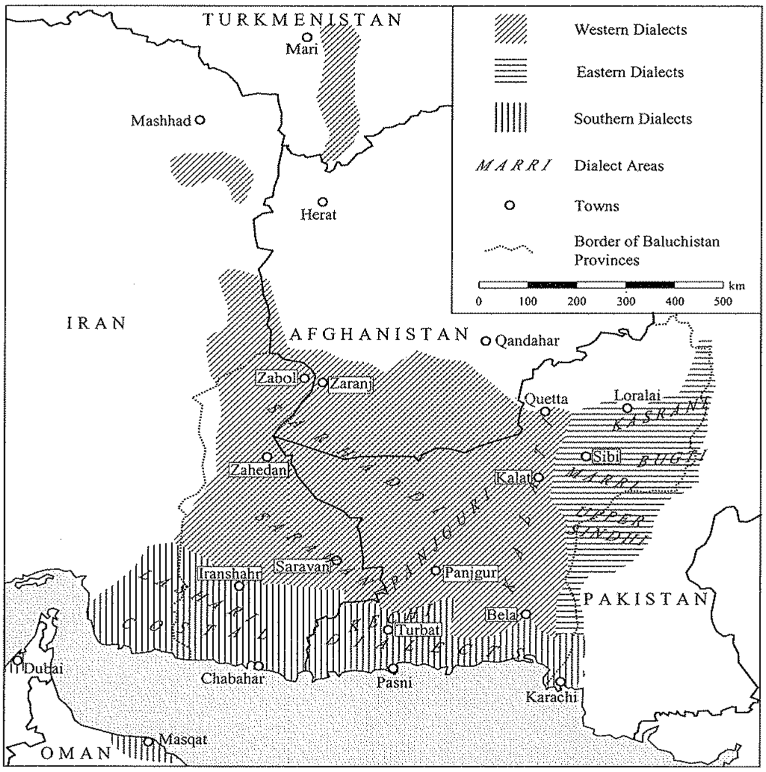
4) Kechi
5) Coastal dialects
6) Eastern Hill Balochi

This last dialect (Eastern Hill Balochi) represents the Eastern group while the rest (1-5) belong to Western Balochi.

Jahani and Korn (2009:636) have broadly divided the Balochi dialects into the three groups of Eastern, Western, and Southern Balochi. In their Balochi dialects division, Sarawani and Panjuri are considered as transitional dialects between Western and Southern Balochi in Iran and Pakistan, respectively. Moreover, in their classification Southern Balochi dialects include the Lashari, Sarbazi, Kechi, and coastal dialect. The three main dialect areas of Balochi (Western, Southern, and Eastern) are shown on Map 1.2. Jahani (2001:59) estimates the total number of Balochi speakers between 5and 8 million.

According to the Balochi dialects divisions that have been discussed above, the corpus data for this thesis can be classified as belonging to the Southern group (Lashari Balochi), Southern-Western group (Sarawani Balochi) and subdialect of the Rakhshani or Western group (Sarhaddi Balochi).

Map1.2 Dialects area of Balochi (Barjasteh Delforooz 2010)



## 1.4 Previous research on the phonological system of Iranian-Balochi dialects

While the oldest works on Balochi language date back to the 19th century (cf. the works of Leech (1838), Lewis (1855), Pierce (1874), and Mockle (1877)), until around twenty years ago there was no extensive description of the Balochi language and its dialects. This was noted by Elfenbein (1990) who writes that in spite of about hundred years that have passed since the pioneering works of Dames and Geiger, there is still "no systematic description of the language as a whole, no dictionary, and no comprehensive description of the dialects". During the last two decades, more systematic work has been done on Balochi (Okati, 2012:17).

The number of works which have been done on the phonological system of Balochi dialects (both Iranian Balochi dialects and non-Iranian Balochi dialects) is limited and no works have been done on the phonology of any Balochi dialects based on OT.

The very first research on the phonology of Balochi is done by Dames (1891). He distinguishes long vowels, short vowels, and diphthongs in Eastern Balochi. Besides that he considers the phenomenon of nasalization in Eastern Balochi as well.

In 1966, Spooner studies the Iranian Balochi dialects, mostly Sarawani Balochi which is spoken in Sistan and Baluchestan province in Iran. In this research, Spooner presents the vowel inventory of Sarawani as *a:, e:, i (e), i:, o, u:,* and also he describes the vowel distribution and phonetic features. On the nasalization process, he explains that final *n* is pronounced only before suffix, otherwise, the vowel is nasalized (Okati, 2012).

In 2003, *The Sarawani dialect of Balochi and Persian influence on it* was published by Baranzehi. The purpose of this paper is to describe the Sarawani dialectal varieties and Persian influence on this dialect. Besides, the phoneme inventory of Sarawani Balochi is presented in his work. He also includes the nasalized form of all vowels of this dialect, but no more study has been done on the phonological system of Sarawani in this article.

Moreover, in 2003 special research on the phonology of Sarawani Balochi was done by Soohani. That MA thesis comprises a contrastive investigation of the phonology of Sarawani dialect of Balochi, from the point of view of the ruling linear and non-linear models of modern phonology.

An extensive contribution to the historical grammar of Balochi is done by Korn and published as a book, *Towards a historical grammar of Balochi, studies in Balochi historical phonology and vocabulary,* in 2005. The main part of the book is a new discussion of historical phonology of Balochi.

Two more works dedicated to the investigation of the phonological system of Iranian Balochi dialects have to be mentioned here. The first, *Balochi* by

Jahani and Korn, was published in 2009 and it provides a description of phonology, morphology, and syntax of Balochi dialects. The phonological section is largely based on the details about the words mentioned in Korn (2005). They briefly present the phoneme inventory, syllable structure and stress patterns of Balochi dialects. The second, *Stress pattern system in Sarawani Balochi* was written in 2010 by Soohani. That MA thesis contains a comprehensives study of stress pattern systems in Sarawani Balochi based on Hayes (1998).

In 2012, the vowel systems of Iranian-Balochi dialects were studied by Okati. In that Ph.D. dissertation, an empirical acoustic analysis is applied to a large body of data on the vowel inventories of different Balochi dialects spoken in Iran.

## 1.5 Methodological remarks on present research

The study of unwritten languages such as Balochi presupposes the use of methods of field linguistics, which is based on both spontaneous and purposeful recording of speech. The spontaneous recording of speech occurs in the process of oral communication of the language under study. The purposeful recording of speech takes place when a speaker is requested to produce an oral text which is written down or recorded on the tape by the researcher (Axenov, 2006). The language data which is used in the present thesis is mostly based on the purposeful recording of speech which was gathered through the author’s trip to Zahedan by interviewing 12 informants during 2010 to 2014. Some language consultants are illiterate and some were educated. Most of them have lived in Sistan and Balochestan their entire lives. This investigation does not take into account language data from nomadic groups (The social security conditions in Zahedan did not allow the present thesis researcher at that time to be out of Sistan and Baluchestan University.). The questionnaire for gathering data in the present study consists of different classes of mono-morphemic words, compound words, complex words, pair words, verbal paradigms, simple transitive and intransitive sentences, and short stories. The present researcher requested each consultant to repeat each item in their own language (Balochi) three times and all data were recorded with a digital recorder.

## 1.6 Theoretical considerations

The phonological analysis in this study will be stated in the framework of Optimality Theory (Prince and Smolensky 1993, McCarthy and Prince 1993a, b). In particular, I will use the new version of representing elements in OT which is known as “comparative tableaux” (Prince 2000). In this sub- section, I present a brief introduction of the basics of OT.

An optimality-theoretic grammar consists of fixed components: the generator of input, candidates that are possible outputs, a set of ranked constraints, and an evaluation system EVAL. The generator GEN is a mechanism that generates candidates, possible phonetic output forms that can basically have any form. The set of constraints CON forms the grammar and works as a filter for the candidates; OT recognizes two types of constraints, faithfulness constraints, and markedness constraints. Markedness constraints are grounded in phonetics and they do not allow the occurrence of sequences which are difficult to articulate or perceive, e.g. voiced codas are dispreferred, syllable onsets are preferred, syllable nuclei should consist of one vowel (Kager 2001). Faithfulness constraints require that outputs preserve similarities between the output and its input. In other words faithfulness constraints oppose changes (Kager 1999). These constraints are universal and violable: a candidate can either violate or satisfy a constraint. Violation of a constraint is possible if and only if such violation is necessary in order to better satisfy a higher-ranking constraint. Given an input, the grammatical output is the one that best satisfies the ranked constraint system among an infinite set of candidate output forms. Consider for example hiatus avoidance in Balochi. In this language, the occurrence of two immediate vocalic syllable peaks is not permitted. Hiatus is resolved in Balochi by inserting a consonant between two vowels, for instance in the morpheme boundary of the present participle and first person singular marker: /distæ-ɑːn/ → [distæ-j-ɑːn] "I have seen". The constraint responsible for epenthesis of /j/ between two vowels is known as (NO HIATUS). I also need constraints against deletion (MAX) and insertion (DEP) of any phonological materials. The constraints are summarized in (1):

(1) NO HIATUS
Vowel hiatus is prohibited

MAX-IO
Input segments must have output correspondents. (No deletion)

DEP-IO
Output segments must have input correspondents. (No epenthesis)

In languages that do not allow vowel hiatus as in Balochi, NO HIATUS markedness constraint must outrank DEP since epenthesis applies in order to prevent hiatus violations. Similarly, MAX must outrank DEP; otherwise, deletion would have been the chosen repair. I cannot establish a ranking between MAX and the NO HIATUS, since the two never conflict in the data we are considering.

(2) NO HIATUS, MAX » DEP

The mapping of the input form to the winning candidate is illustrated by using a constraint tableau (3):

(3) Tableau of vowel hiatus resolution in Balochi (to be revised)

| Input: /distæ-ɑːn/ | NO HIATUS | MAX-IO | DEP-IO |
|---|---|---|---|
| a. ☞ distæ-j-ɑːn | | | *! |
| b. distæ-n | | *! | |

The input form is shown in the upper left-hand cell. The candidate output forms that we are considering are listed below the input form (even though the candidate set is infinite, few candidates are only listed). The winning candidate is indicated by a pointing hand☞. The constraints that constitute the grammar are listed at the top. A broken line between columns indicates the lack of evidence for crucial ranking between the constraints so separated. A solid line indicates that the left-hand constraint outranks the right-hand one. An asterisk in a cell indicates a constraint violation. Fatal violations are indicated by an asterisk followed by an exclamation mark. Cells that are irrelevant to determining the grammatical output are shaded. The only purpose of the pointing hand, exclamation mark, and shading is to make the tableau easier to read (Orhan Orgun 1996).

### 1.6.1 Comparative tableaux

Prince (2000) suggests a new version of representing elements in OT which is known as "comparative tableaux". In this format, each candidate is a desired optimum or competes with the desired optimum which is indeed suboptimum. To examine comparative tableau, again consider vowel hiatus resolution in Balochi, which has already been represented in comparative star-marking format as in (3), in the following comparative tableau:

(4) Comparative tableau version of vowel hiatus resolution in Balochi (to be revised)

| Input: /distæ-ɑːn/ | NO HIATUS | MAX-IO | DEP-IO |
|---|---|---|---|
| a. ☞ distæ-j-ɑːn | | | * |
| b. distæ-n | | *W | L |

As tableau (4) represents, the optimal candidate is the candidate (a), so it is the optimum candidate and candidate (b) is the suboptimum candidate. *W* shows that the constraint ranking prefers the desired optimum candidate (prefers the Winner, in this case, candidate (a)) and *L* shows that the constraint ranking prefers the desired suboptimum candidate (prefers the Loser, here we mean candidate (b)) and *blank* means constraint does not distinguish the candidates. In ranking theory, each *L* must be preceded by a *W* (Prince, 2000: 3).

## 1.7 Purpose and significance of the study

This work investigates the phonological system of three Iranian-Balochi dialects, i.e., Sarawani Balochi, Lashari Balochi and Mirjaveh Sarhaddi Balochi from OT point of view, and is the first systematic study of its own on these dialects.

Although some descriptions have previously been done on the phonological system of Balochi, the present study can be considered as the starting point for doing both descriptive and theoretical studies on the phonological system of Iranian-Balochi dialects, mainly providing each description with its relevant "comparative tableaux".

This Study of Balochi can partly be seen as a contribution to Balochi language documentation. Furthermore, this study can serve as a model for further study of other Iranian languages and dialects. Additionally, it can be also helpful in the reconstruction of the phonological system of older Iranian languages such as Old Persian and Parthian. Finally, the data and results provide philologists with information that helps them have the most comprehensive understanding of the phonological typology of the language in the area.

*The Phonological of Iranian-Balochi Dialects: Description and Analysis* is organized into six chapters. The second chapter presents a segmental phonology of three Iranian-Balochi dialects, which shows the phoneme inventories of these three dialects and analyses the allophonic variations of these dialects based on OT. Chapter three describes the suprasegmental and prosodic phonology of IBDs. First the syllable structure, geminate and stress pattern system in these dialects are described, and then the relevant OT analyses are given as well. The phonological processes in these three Iranian-Balochi dialects observed in the data such as metathesis, local assimilation, hiatus resolution, and deletion are investigated and analyzed in the OT approach in chapter four. Chapter five is dedicated to the study of the phonological interface in Iranian- Balochi dialects; it focuses on the interaction between phonology and morphology, for instance, reduplication, root-affix asymmetry, phonologically conditioned allomorph selection and phonological sensitivity to morphological structure. Chapter six consists of the general conclusion, which describes similarities and differences between the dialects (focusing on microvariations) and sums up the study.

# Chapter (2)

## Segmental Phonology of Iranian-Balochi Dialects

As it has been discussed in the introduction section, phonology is defined as the study of sound systems, how speech sounds structure and function in languages. Also the phonological study refers to the inventory of segments in a language. In the following chapter, a close look will be taken at the IBDs inventory of segments. Both speech sounds which can be used in IBDs to distinguish words of different meaning (phonemes) and other sounds which cannot (allophones) will be identified. Moreover, since speech sounds are the product of human organs, it is not surprising to find similarities across IBDs speech sounds and other languages. For example, finding the segments (both vowels and consonants) which are claimed as universal sounds, like back low vowel [ɑ] and sounds which are more restricted in their distribution in the world's languages as retroflex consonants [ʈ,ɖ, ɻ]. In addition, it will be shown how the allophonic patterns in IBDs can be stated and predicted in terms of violable constraints.

This chapter is organized as follows. Section 2.1 will introduce the phonological inventories in IBDs, consonants and vowels. Section 2.2 will discuss the analysis of IBDs allophonic variations such as the distribution of aspirated stop and affricates, vowel nasalization, and the distribution of velar nasal based on markedness and faithfulness constraints rankings. Finally, section 2.3 deals with the prediction of IBDs retroflex consonants distribution in the OT framework.

## 2.1 Phonological inventories in IBDs

The whole set of phones found in the data is represented in the following charts. Amongst these phones, the phonemes will be recognized through the analysis. The analysis will thus show which of these sounds are phonemes (which could be all or only some of them), and which of them are allophones. After establishing the phonemes, they will be represented in the final phoneme charts.The allophones will also be charted.

### 2.1.1 Consonant inventory

The following chart illustrates all consonants which have been found in IBDs.

| | bilabial | Alveodental | alveolar | postalveolar | retroflex | palatal | velar | uvular | glottal |
|---|---|---|---|---|---|---|---|---|---|
| Stops | p b | t d | | | ʈ ɖ | | k g | | ʔ |
| | $p^h$ | $t^h$ | | | $ʈ^h$ | | $k^h$ | | |
| Fricatives | | | s z | ʃ ʒ | | | ɣ | χ | h |
| Affricates | | | | tʃ dʒ<br>$tʃ^h$ | | | | | |
| Nasals | m | | n | | | | ŋ | | |
| Central approximants | w | | r | | ɻ | j | | | |
| Lateral approximants | | | l | | | | | | |

(1) IBDs consonants (Phonemes and allophones)

Now, for establishing the phoneme inventories of IBDs (both consonants and vowels), the method of minimal pair and near-minimal pair are used to recognize separate phonemes of IBDs, indeed a minimal pair is the most effective way to illustrate that two sounds are distinct phonemes (Hayes, 2009: 20). So when two sounds are separate phonemes, they are in contrast. There are also pairs of sounds in IBDs that do not contrast, so they are not separate phonemes, the reason is that their distribution is predictable, in fact they are in complementary distribution and there is an allophonic relation between them.

Furthermore, each segment will be represented by set of features which is known as feature matrix, and also the articulatory realization of each phoneme will be given as well. Besides, for each phoneme I try to give examples of all three dialects, i.e. Sarawani, Lashari and Sarhaddi Balochi.

### 2.1.1.1 Stops

In IBDs, as in many other languages, the stops are [+obstruent] ([-sonorant]), [-continuant], [+consonantal] and [-syllabic].

Stop consonants in IBDs are as follows:

a. The phoneme /p/ is a voiceless bilabial stop.
[+obstruent, - continuant, -voiced, +labial]

Data (2) illustrate that in specific contexts phoneme /p/ becomes aspirated. Indeed, [p$^h$] occurs in onset position like in (a.i- a.iii), but neither in word-final position nor when it precedes voiceless consonant as in (b.i- b.iii), but [p] is an elsewhere allophone, it occurs not just before voiceless consonants, but at the end of the word. So, they are in complementary distribution. The concrete sounds [p] and [p$^h$] are allophones of /p/.

(2) Words with [p$^h$] Words with [p]

| | | | | | |
|---|---|---|---|---|---|
| a.i. | [p$^h$es] | 'father' | b.i | [dʒopt] | 'pair' |
| a.ii | [p$^h$rotʃ] | 'broke' | b.ii | [lɑːp] | 'stomach' |
| a.iii | [næp$^h$æs] | 'breath' | b.iii | [hæptægɑːn] | 'ceremony' |

Data (3) includes examples forming a minimal pair for consonant /p/ and other phonemes in IBDs.

(3) Words with /p/ Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i. | p/- /b/ | [p$^h$æd] | 'foot print' | [bæd] | 'bad' |
| a.ii | /p/- /d/ | [p$^h$ær] | 'feather' | [dær] | 'door' |
| a.iii | /p/- /t/ | [p$^h$ær] | 'feather' | [tær] | 'it' |
| a.iv | /p/- /ɖ/ | [p$^h$æl] | 'field' | [ɖæll] | 'weald' |
| a.v | /p/- /k/ | [p$^h$ætʃ] | 'cooking' | [k$^h$ætʃ] | 'saddlebag' |
| a.vi | /p/- /g/ | [p$^h$æʈ] | 'iald' | [gæʈʈ] | 'bite' |
| a.vii | /p/- /tʃ/ | [p$^h$æl] | 'field' | [tʃ$^h$æll] | 'wrinkle' |
| a.vii | /p/- /dʒ/ | [p$^h$æd] | 'foot print' | [dʒæd] | 'ancient' |
| a.ix | /p/- /l/ | [p$^h$ær] | 'feather' | [lærr] | ' data' |
| a.x | /p/- /m / | [p$^h$ætʃ] | 'cooking' | [mætʃtʃ] | 'palm tree' |
| a.xii | /p/- /n/ | [p$^h$æl] | 'field' | [næl] | 'bamboo' |

b. The phoneme /b/ is a voiced bilabial stop.
[+obstruent, -continuant, +voiced, +labial]

Following data show the comparison of /b/ and other phonemes. It proves that /b/ is a distinctive phoneme in IBDs.

(4) Words with /b/ Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /b/-/d/ | [bɑːg] | 'garden' | [dɑːg] | 'hot' |
| a.ii | /b/-/t/ | [bɑːl] | 'Wind' | [thɑːl]' | ' tub' |
| a.iii | /b/-/k/ | [berr] | 'gazing' | [khell] | 'hole' |
| a.iv | /b/-/g/ | [bɑːm] | 'a kind of herbal' | [gɑːm] | 'step' |
| a.v | b/-/m/ | [bɑːk] | 'petrol tank' | [mɑːk] | 'bean' |

| | | | | | |
|---|---|---|---|---|---|
| a.vi | /b/-/dʒ/ | [bæʈʈ] | 'duck' | [dʒæʈʈ] | 'foolish' |
| a.vii | /b/-/tʃ/ | [bell] | 'hire' | [tʃhell] | 'dirt' |
| a.viii | /b/-/n/ | [bɑ:n] | 'roof' | [nɑ:n] | 'bread, food' |
| a.ix | /b/-/z/ | [bi:t] | 'probably' | [zi:t] | 'get' |

c. The Phoneme /t/ is a voiceless alveolar stop.
[+obstruent, -continuant, -voiced, +coronal, +anterior]

The data in (5) show that phoneme /t/ like /p/ is realized as an aspirated consonant in the onset position, but not in word-final position. But, [t] occurs elsewhere.

So, by looking at following data one can determine that [t] and [t$^{h}$] are allophonic variant:

(5)

| Words with | [t$^{h}$] | Words with | [t] | | |
|---|---|---|---|---|---|
| a.i | [dænt$^{h}$ɑ:n] | 'teeth | b.i | [hæpt] | 'seven' |
| a.ii | [t$^{h}$uel] | 'weigh' | b.ii | [p$^{h}$uest] | 'skin' |
| a.iii | [t$^{h}$ru:] | 'aunt' | b.iii | [p$^{h}$et] | 'father' |

Following minimal pairs demonstrate that the /t/ is a separate phoneme.

(6) Words with /t/ Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /t/- /d/ | [t$^{h}$ɑ:r] | 'opaque' | [dɑ:ɹr] | 'wood' |
| a.ii | /t/- /k/ | [t$^{h}$ɑ:l] | 'a flat round tub' | [k$^{h}$ɑ:l] | 'unripe' |
| a.iii | /t/- /g/ | [t$^{h}$ɑ:s] | 'bowl | [gɑ:z] | 'gas' |
| a.iv | /t/- /ɖ/ | [t$^{h}$ɑ:l] | 'a flat round tub' | [ɖɑ:ll] | 'lentil' |
| a.v | /t/- /s/ | [t$^{h}$ɑ:k] | 'vine' | [sɑ:k] | 'bag' |
| a.vi | /t/- /z/ | [t$^{h}$ɑ:r] | 'opaque' | [zɑ:r] | 'plaint' |
| a.vii | /t/- /ʃ/ | [t$^{h}$ɑ:l] | 'a flat round tub' | [ʃɑ:l] | 'scarf' |
| a.viii | /t/- /h/ | [t$^{h}$æɹ] | 'it' | [hær] | 'donkey' |
| a.ix | /t/- /dʒ / | [t$^{h}$uel] | 'iigh' | [dʒuel] | 'backhander' |
| a.x | /t/- /tʃ/ | [t$^{h}$æp] | 'fever' | [tʃ$^{h}$æp] | 'left' |
| a.xi | /t/- /n/ | [t$^{h}$u:ɹ] | 'net' | [nu:r] | 'light' |
| a.xii | /t/-/w/ | [t$^{h}$ɑ:r] | 'rope' | [wɑ:r] | 'easy breath' |

(d) The phoneme /d/ is a voiced alveolar stop.
[+obstruent, -continuant, +voiced, + coronal, +anterior]

Each row in (7) has words which are identical except for their initial sounds. Since, they are different words, it follows that /d/ is a distinctive sound.

| (7) | Words with /d/ | | | Words with other phonemes | |
|---|---|---|---|---|---|
| a.i | /d/-/ʈ/ | [diem] | 'face' | [ʈiem] | 'time' |
| a.ii | /d/- /ɖ/ | [dæm] | 'stew' | [ɖæm] | 'swallow' |
| a.iii | /d/- /k/ | [dæɹ] | 'door' | [$k^h$æɹ] | 'deaf' |
| a.iv | /d/- /g/ | [del] | 'heart' | [gel] | 'mud' |
| a.v | /d/- /s/ | [duːr] | 'far' | [suːr] | 'circumcision |
| a.vi | /d/- /z/ | [dær] | 'door' | [zær] | 'money' |
| a.vii | /d/- /ʃ/ | [dæp] | 'mouth' | [ʃæp] | 'night' |
| a.viii | /d/-/ʒ/ | [del] | 'heart' | [ʒel] | 'gel' |
| a.ix | /d/- /h/ | [dæ] | 'door' | [hæɹ] | 'donkey' |
| a.x | /d/- /r/ | [duːʃ] | 'shoir bath' | [ruːʃ] | 'glandule' |
| a.xi | /d/- /l/ | [dɑːr] | 'wood' | [lɑːl] | 'deaf' |
| a.xii | /d/-/j/ | [dɑːr] | 'wood' | [jɑːr] | 'friend' |

e. The phoneme /ʈ/ is a voiceless retroflex stop.
[+obstruent, -continuant, - voiced, +coronal, -anterior, -distribute]

In the consonant inventory of IBDs, retroflex consonants are also observed. The /ʈ/ becomes aspirated in the word-initial position and not in word-final position as in (8), while unaspirated [ʈ] is an elsewhere allophone.

| (8) | Words with [$ʈ^h$] | | | Words with [ʈ] | |
|---|---|---|---|---|---|
| a.i | [ʈhɑ:b] | 'wave' | b.i | [mueʈ] | 'unfortunate' |
| a.ii | [ˈʈhiel] | 'hair oil' | b.ii | [kɑːʈ] | 'nipper' |

The data in (8) show that /$ʈ^h$/ is an allophone of phoneme /ʈ/, while data (9) illustrates that /ʈ/ is distinctive and hence a phoneme.

| (9) | Words with /ʈ/ | | | Words with other phonemes | |
|---|---|---|---|---|---|
| a.i | /ʈ/-/s/ | [ʈhɑ:b] | 'wavy hair' | [sɑ:b] | ' mathematic' |
| a.ii | /ʈ/-/n/ | [ʈhærr] | 'big', | [nær] | 'male' |
| a.iii | /ʈ/-/w/ | [ʈhɑ:b] | 'wave', | [wɑ:b] | 'sleep' |
| a.iv | /ʈ/-/h/ | [ʈheir] | 'tire' | [heir] | 'goodness' |
| a.v | /ʈ/- /l/ | [ʈhuep] | 'ball' | [luep] | 'loose trousers' |
| a.vi | /ʈ/- /r/ | [ʈhuep] | 'ball' | [reup] | 'broom!' |

(e) The phoneme /ɖ/ is a voiced retroflex stop.
[+obstruent, -continuant, +voiced, +coronal, -anterior, -distributed]

The comparison of /ɖ/ and other phonemes in IBDs is given in (10).

(10)

| | Words with /ɖ/ | | Words with other phonemes | |
|---|---|---|---|---|
| a.i | /ɖ/-/k/ | [ɖæll] 'plateau' | [khæl] | 'ditch' |
| a.ii | /ɖ/- /tʃ/ | [ɖæm] 'swallow' | [tʃæmm] | 'eye' |
| a.iii | /ɖ/- /dʒ/ | [ɖæn] 'out' | [dʒæn] | 'woman' |
| a.iv | /ɖ/- /h/ | [ɖiel] 'rolling' | [hiel] | 'habit' |
| a.v | /ɖ/- /s/ | [ɖekk] 'hill' | [sek] | 'Indian' |
| a.vi | /ɖ/- /n/ | [ɖæm] 'swallow' | [næm] | 'it' |
| a.vii | /ɖ/- /m/ | [ɖæn] 'out' | [mæn] | 'I' |

(f) The phoneme /k/ is a voiceless velar stop.
[+obstruent, -continuant, -voiced, +dorsal +high]

Data (11) illustrate that /k/ realized as aspirated consonant exactly like / p/, /t /, and/ ʈ/ in an onset position or when it is folloid by a voiced segment, but not when it is followed by voiceless segment or in the word-final position. So, [k] and [$k^h$] are allophonic variants.

(11)

| Words with [$k^h$] | | | Words with [k] | |
|---|---|---|---|---|
| a.i | [(ʔ)æ$k^h$l] 'wisdom' | b.i | [sækp] | 'roof' |
| a.ii | [$k^h$ɑ:h] 'straw' | b.ii | [moʃk] | 'mouse' |
| a.iii | [$k^h$ɨp] 'bag' | b.iii | [gwæk] | 'frog' |

Data (12) show that /k/ is a separate phoneme.

(12)

| | Words with /k/ | | Words with other phonemes | |
|---|---|---|---|---|
| a.i | /k/-/g/ | [khæm] 'little', | [gæm] | 'grief' |
| a.ii | /k/-/ʃ/ | [khæ] 'somebody' | [ʃæs] | 'sixty' |
| a.iii | / k/-/s/ | [khæd] 'who', | [sæd | 'hundred' |
| a.iv | /k/-/h/ | [kherr] 'corner' | [heɹ] | 'foal' |
| a.v | /k/-/r/ | [khɑ:h] 'straw' | [rɑ:h] | 'way' |
| a.vi | /k/-/z/ | [khipp] 'tight', | [zi:p] | 'zipper' |
| a.vii | /k/-/w/ | [khɑ:b] 'frame' | [wɑ:p | 'sleeping' |
| a.viii | /k/-/n/ | [khæll] 'hole' | [næl] | 'reed' |
| a.ix | k/-/m/ | [khɑ:h] 'straw' | [mɑ:h] | 'moon' |

(g) The phoneme /g/ is a voiced velar stop.
[+obstruent, -continuant, +voiced, +dorsal, +high]

(13) lists the comparison between phoneme /g/ and other phonemes in IBDs.

(13) Words with /g/ Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /g/-/ʃ/ | [gɑ:m] | 'step' | [ʃɑ:m] | 'dinner' |
| a.ii | /g/-/s/ | [gɑ:r] | 'lost' | [sɑ:r] | 'wise' |
| a.iii | /g/-/h/ | [gɨʃ] | 'time' ` | [hɨs] | 'be quite' |
| a.iv | /g/-/l/ | [goɖɖ] | 'next' | [loɖɖ] | 'nap' |
| a.v | /g/-/r/ | [gɑ:z] | 'gas' | [rɑ:z] | 'secret' |
| a.vi | /g/-/w/ | [gɑ:m] | 'step' | [wɑ:m ] | 'loan' |
| a.vii | /g/-/dʒ/ | [gæm] | 'grief' | [dʒæm] | 'addition' |
| a.viii | /g/-/tʃ/ | [go:n] | 'with' | [tʃo:n] | 'how' |

(h) The phoneme /ʔ/ is a voiceless glottal stop.
[+obstruent, -continuant, -voiced, + constricted glottis]

Data (14) show that the /ʔ/ is considered as a phoneme in IBDs. It has restricted distribution and only occurs before vowel in an onset position.

(14) Words with /ʔ/ Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /ʔ/- /h/ | [ʔængir] | 'grape' | [hendʒi:r] | 'fig' |
| a.ii | /ʔ/-/d/ | [ʔæwæl] | 'first' | [dowom] | 'second' |
| a.iii | /ʔ/-/m/ | [ʔeʃk] | 'love' | [moʃk] | 'mouse' |
| a.iv | /ʔ/- /s/ | [ʔɑ:p] | 'water' | [sɑ:p] | 'soft' |

In sum, based on the examples in 1- 14, stops in IBDs include /p, b, t, d,ʈ, ɖ, k, g, ʔ/. Additionally, all voiceless stop consonants in IBD have aspirated allophones. Indeed, in the case of allophony, phonetic contrast exists without phonemic contrast, in which a single underlying segment has phonetically distinct surface realizations (Currie Hall, 2011).

### 2.1.1.2 Fricatives

In IBDs, the fricatives are [+obstruent], [+continuant], [+consonantal] and [-syllabic]. Fricative consonants in IBDs are as follows:

a. The phoneme /s/ is a voiceless alveolar fricative.
[+obstruent, +continuant, -voiced, +anterior, +coronal, +strident]

Following data illustrate the comparison of phoneme /s/ and other phonemes.

(15) Words with /s/ — Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /s/- /z/ | [sɑːl] | 'year' | [zɑːl] | 'old' |
| a.ii | /s/- /ʃ/ | [sɑːp] | 'soft' | [ʃɑːp] | 'hit' |
| a.iii | /s/- /h/: | [sɑːk] | 'bag' | [hɑːk] | 'land, dust' |
| a.iv | /s/- /m/ | [soːr] | 'hen leg' | [moːr] | 'herb' |
| a.v | /s/- /l/ | [suːt] | 'whistle' | [luːt] | 'desert' |
| a.vi | /s/- /r/ | [suetʃ] | 'burn!' | [ruetʃ] | 'day' |
| a.vii | /s/- /ɽ/ | [lies] | 'lick' | [lieɽ] | 'unfortunate' |

b. The phoneme /z/ is a voiced alveolar fricative.
[-sonorant, +continuant, +voiced, +anterior, +coronal, +strident]

Data (16) indicates that the /z/ is a separate phoneme in IBDs.

(16) Words with /z/ — Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /z/-/h/ | [zɑːn] | 'knee' | [hɑ;n] | 'sir' |
| a.ii | /z/-/l/ | [zekk] | 'a leather bottle' | [lek] | 'long' |
| a.iii | /z/-/m/ | [ziːn] | 'saddle' | [miːn] | 'mine' |
| a.iv | /z/-/n/ | [zɑːt] | 'origine' | [nɑːt] | 'put' |
| a.v | /z/-/tʃ/ | [zɑːl] | 'old' | [tʃɑːl] | 'hole' |
| a.vi | /z/-dʒ/ | [zærr] | 'money' | [dʒærr] | 'desert bush' |
| a.vii | /z/-/w/ | [zɑːn] | 'knee' | [wɑːn] | 'reading' |

c. The phoneme /ʃ/ is a voiceless post-alveolar fricative.
[+obstruent, +continuant, -voiced, -anterior, +coronal, distributed, +strident]

The following data displays that the /ʃ/ is a distinctive phoneme in IBDs.

(17) Words with /ʃ/ — Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /ʃ/- /h/ | [ʃɑːn] | 'pride' | [hɑːn] | 'yes' |
| a.ii | /ʃ/- /ʒ/ | [ʃen] | 'sand' | [ʒen] | 'gene' |
| a.v | /ʃ/- /m/ | [ʃɑːn] | 'pride' | [mɑːn] | 'enter' |
| a.vii | /ʃ/- /r/ | [ʃued] | 'wash' | [rued] | 'stream' |
| a.viii | /ʃ/- /l/ | [ʃuːl] | 'zigzag' | [luːl] | zonked' |

d. The phoneme /ʒ/ is a voiced postalveolar fricative.
[+obstruent, +continuant, +voiced, -anterior, +coronal, +distributed +strident]

The present data show that /ʒ/ mostly occurs in loanwords and its distribution is limited to the onset position, but as there are minimal pairs, it constitutes a phoneme of its own:

(18) Words with /ʃ/Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /ʒ/- /s/ | [ʒel] | 'gel' | [sel] | 'tuberculosis' |
| a.ii | /ʒ/- /p/ | [ʒænd] | 'tired' | [pænd] | 'advice' |
| a.iii | /ʒ/- /tʃ/ | [phæʒm] | 'wool' | [tʃæmm] | 'eye' |

e. The phoneme /h/ is a voiceless glottal fricative.
[+obstruent, +continuant, –voiced, +spread glottal]

The comparison of / h/ and other phonemes is demonstrated in (19).

(19) Words with /h/ Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /h/-/m/ | [hɑ:k] | 'soil' | [mɑ:k] | 'bean' |
| a.ii | /h/-/j/ | [hɑ:r] | 'necklace' | [jɑ:r] | 'friend' |
| a.iii | /h/-/r/ | [hɑ::s] | 'special' | [rɑ:s] | 'right' |
| a.iv | /h/-/dʒ/ | [hɑ:n] | 'sir' | [dʒɑ:n] | 'body' |
| a.v | /h/-/w/ | [hæʃʃ] | 'mill' | [wæʃʃ] | 'beautiful' |
| a.vi | /h/- /ʔ/ | [hers] | 'bear' | [ʔærs] | 'tear' |
| a.vii | /h/- /z/ | [rɑ:h] | 'road, way' | [rɑ:z] | 'secret' |
| a.viii | /h/- /d/ | [srɑ:h] | 'house' | [srʊd] | 'anthem' |

(f) The phonemes /ɣ/ and /χ/

The two fricative consonants /χ/ and /ɣ/ are observed only in the pronunciation of loan words by educated IBDs speakers, I will return to loanword phonology in the next chapter.

The phoneme /χ/ is a voiced uvular fricative.
[+obstruent, +continuant, +dorsal, + high, + voiced]

(20) Words with /χ/

| | | |
|---|---|---|
| a.i | [wæχt] | 'time' |
| a.ii | [sæχm] | 'roof' |
| a.iii | [ræχs] | 'dance' |

The phoneme /ɣ/ is a voiceless velar fricative.
[+obstruent, +continuant, +dorsal, + high, - voiced]

(21) Words with /ɣ/

| | | |
|---|---|---|
| a.i | [ʃoloɣ] | ‘busy’ |
| a.ii | [ɣɑːʃok] | ‘spoon’ |

Thus, based on data in 15-21, fricatives in IBDs are /s, z, ʃ, ʒ, ɣ, χ, h]

**2.1.1.3 Affricates**

In IBDs, the affricates are [+obstruent], [-continuant], [+coronal], [+consonantal] and [-syllabic]. IBDs affricates are as follows:

(a) The phoneme /tʃ/ is a voiceless postalveolar affricate.
[+obstruent, - continuant, -voiced, +coronal, -anterior, +distributed, +strident]

/tʃ/ realized as an aspirated from when it occurs in the prevocalic and postvocalic position, but not in word-final position nor when it precedes voiceless consonant, so there is an allophonic relation between /tʃ/ and /tʃʰ/as data in (22).

(22)

| Words with [tʃʰ] | | Words with [tʃ] | |
|---|---|---|---|
| a.i | [tʃhærk] ‘wheel’ | b.i | [giːtʃ] ‘confused’ |
| aii | [tʃhætʃ] ‘stuttering’ | b.ii | [dræhtʃ] ‘tree’ |

The following data shows that the /tʃ/ is a separate phoneme.

(23)

| Words with /tʃ/ | | | | Words with other phonemes | |
|---|---|---|---|---|---|
| a.i. | /tʃ/ -/dʒ/ | [tʃhɑːh] | ‘ill’, | [dʒɑːh] | ‘place’ |
| a.ii | /tʃ/- /m/ | [tʃhɑːkk] | ‘crack’ | [mɑːk] | ‘grass pea’ |
| a.iii | /tʃ/- /n/ | [tʃhɑːr] | ‘four’ | [nɑːr] | ‘hell’ |
| a.iv | /tʃ/- /r/ | [tʃhuːʃ] | ‘suck’ | [ruːʃ] | ‘glandule’ |
| a.v/ | tʃ/- /l/ | [tʃuːtʃ] | ‘tiny’ | [luːtʃ] | ‘naked’ |

(b) The phoneme /dʒ/ is a voiced postalveolar affricate.
[+obstruent, - continuant, +voice, +coronal, -anterior, +distribute +strident]

Data (24) illustrates that /dʒ/ is a separate phoneme.

(24) Words with /dʒ/ Words with other phonemes

| | | | | | | |
|---|---|---|---|---|---|---|
| a.i | /dʒ/-/l/ | [dʒærr] | 'dessert bush' | [lærr] | 'part of date' |
| a.ii | /dʒ/-/r/: | [dʒɑ:n] | 'body' | [rɑ;n] | 'the thigh' |
| a.iii | /dʒ/-/m/ | [dʒoz] | 'part' | [moz] | 'salary' |
| a.iv | /dʒ/-/w/ | [dʒɑ:r] | 'brawl' | [wɑ:r] | 'patient' |

### 2.1.1.4 Nasals

In feature theory, nasals can defined as [+ sonorant, - approximant]. The list of nasals consonants in IBDs is as follows:

(a) The phoneme /m/ is a voiced bilabial nasal.
[+sonorant, -approximant, +nasal, + labial]

The comparison of /m/ and other phonemes in IBDs is shown in (25).

(25) Words with /n/ words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /m/-/n/ | [motʃtʃ] | 'group, band', | [notʃ] | 'no' |
| a.ii | /m/-/l/ | [mɑ:ʃ] | 'a kind of bean' | [lɑ:ʃ] | 'corpse' |
| a.iii | /m/-/r/ | [mɑ:h] | 'moon', | [rɑ:h] | 'way' |
| a.iv | /m/-/w/ | [mæs] | 'drunk', | [wæs] | 'desire' |

(b) The phoneme /n/ is a voiced alveolar nasal.
[+sonorant, -approximate, +nasal, +coronal, +anterior]

Data (26) shows that there is a phonetic contrast between [n] and [ŋ]. The velar nasal [ŋ] only occurs when it is followed by [g] or [k], but [n] occurs elsewhere. So they are in complementary distribution. [n] and [ŋ] are allophonic variants.

(26) Words with [ŋ] Words with [n]

| | | | | | |
|---|---|---|---|---|---|
| a.i | [loŋg] | 'loin-cloth' | b.i | [bænd] | 'rope' |
| a.ii | [seŋg] | 'stone' | b.ii | [ʃunz] | 'green' |
| a.iii | [heŋg] | 'stupid' | | | |
| a.iv | [tænk] | 'tight' | | | |
| a.v | [rink] | 'sand' | | | |

The phonemic contrast among /n/ and other phonemes can be illustrated by data (267).

| (27) | Words with /n/ | | | | Words with other phonemes | |
|---|---|---|---|---|---|---|
| | a.i | /n/- /r/: | [niem] | 'half' | [riem] | 'dirt' |
| | a.ii | /n/- /l/: | [nær] | 'male' | [lærr] | 'dry date' |
| | a.iii | /n/- /w/ | [nɑːm] | 'name' | [wɑːm] | 'loan' |
| | a.iv | /n/- /j/ | [nɑːr] | 'hell' | [jɑːr] | 'friend' |

### 2.1.1.5 Approximants

Approximants divide into two groups: (1) central approximants as phoneme /r/ and (2) lateral approximants like phoneme /l/. Both central and lateral approximant found in the consonant inventory of IBDs as shown below.

(a) Lateral approximant: Phoneme /l/ is a voiced alveolar approximant.
[+consonantal, +approximant, +coronal, +anterior, +lateral]

The phonemic status of /l/ is illustrated in examples (28). Phoneme /l/ has been already compared in stops, fricatives, affricates and nasals.

| (28) | Word with /l/ | | | Word with other phoneme | |
|---|---|---|---|---|---|
| | /l/-/w/ | [lɑːʃ] | 'corpse' | [wɑːʃ] | 'Khash' |

(b) Central approximants

(I) Phoneme /ɻ/ is a voiced retroflex approximant.
[+ consonantal, + approximant, + tap, + coronal, - anterior]

Axenov (2006: 44) mentions that /ɻ/ is often treated as the allophone of voiced retroflex stop /ɖ/ in Balochi of Turkmenistan (BT), but in IBDs there is no evidence to support his idea. Moreover, i cannot consider /ɻ/ to be incompelmentry distribution with /r/, since phoneme /r/ can be found in all positions as it is shown in (28). In IBDs as in BT, the distribution of /ɻ/ is restricted to the word-final position. It seems /ɻ/ can never occur in word-initial position nor form any clusters.

2.2.5 The approximants in (29) shows that /ɻ/ is a separate phoneme in IBDs.

| (29) | Words with /ɻ/ | | | | Words with other phonemes | |
|---|---|---|---|---|---|---|
| | a.i | /ɻ/- /ʒ/ | [buːɻ] | 'louse', | [buːʒ] | 'stiff hair' |
| | a.ii | /ɻ/- /ʃ/ | [dʒueɽɻ] | 'health' | [dʒueʃ] | 'boil' |
| | a.iii | /ɻ/- /l/ | [wɑːɻ] | 'stable', | [wɑːl] | 'cotton' |

| | | | | | |
|---|---|---|---|---|---|
| a.iv | /ɽ/- /m/ | [buːɽ] | 'louse', | [buːm] | 'owl' |
| a.v | /ɽ/- /n/ | [dʒɑːɽ] | 'twin' | [dʒɑːn] | 'body' |
| a,vi | /ɽ/- /r/ | [buːɽ] | 'louse' | [muːr] | 'aunt' |

(II) Phoneme /r/ is a voiced alveolar approximant.
[+consonantal, +approximant, trill, +coronal, +anterior]

Phoneme /r/ has been already compared to other phonemes in stops, fricatives and affricates and nasals.

(30) Words with /r/ — Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /r/-/l/: | [ros] | 'cooked food' | [lo:z]' | 'spit' |
| a.ii | /r/-/w/: | [ræs] | 'ripe' | [wæs] | 'desire' |
| a.iii | /r/-/ l/ | [tʊr] | 'net' | [tu:l] | 'length' |
| a.iv | /r/- /ɡ/ | [piːr] | 'old' | [piːɡ] | 'fat' |

(III) Phoneme /w/ is a voiced bilabial approximant.
[- consonantal, +approximant, +labial]

Phoneme /w/ has been already shown in from of minimal pair in stops, fricatives, affricates and nasals. The data in (31) illustrate the comparison between /w/ and /j/.

(31) Word with /w/ — Word with /j/

| | | | | | |
|---|---|---|---|---|---|
| a.i | /w/-/j/ | [wɑ: r] | 'patient' | [jɑ: r] | 'friend' |

(IV) Phoneme /j/ is a voiced velar approximant.
[- consonantal, +approximant, +dorsal, +high]

Phoneme /j/has been already compared in plosive, fricative, affricate and approximant.

Thus, based on all above minimal pairs, the consonant system of IBDs consists of 6 allophones and 25 phonemes which are shown in table (32) and (33) respectively.

(32) IBDs allophones: consonants

| | labial | alveodental | Alveolar | postalveolar | retroflex | velar |
|---|---|---|---|---|---|---|
| plosive | $P^h$ | $t^h$ | | | $ʈ^h$ | $k^h$ |
| affricate | | | tʃ$^h$ | | | |
| nasal | | | | | | ŋ |
| | | | | | | |

(33) IBDs phonemes: consonants

| | labial | alveodental | alveolar | postalveolar | retroflex | velar | uvular | glottal |
|---|---|---|---|---|---|---|---|---|
| plosive | p b | t d | | | ʈ ɖ | k ɡ | | ʔ |
| fricative | | | s z | ʃ ʒ | | ɣ | χ | h |
| affricate | | | | tʃ dʒ | | | | |
| nasal | m | | n | | | | | |
| Central approximant | w | | r | | ɻ | j | | |
| Lateral approximant | | | | l | | | | |

### 2.1.2 Vowel inventory

The following chart represents the complete set of vowels which are common in three Balochi dialects data. However, vowel variations are observed among three dialects, in Sarawani Balochi there are two more back vowels [ɪ] and [ʊ] which are not found in two other dialects. Moreover, each dialect has its own diphthongs: Sarhaddi Balochi: [ie], [ue], Sarawani Balochi: [ou], [ei] and Lashari Balochi: [uə], [iə].

(34) IBDs vowels: (phonemes and allophones)

| [+front, -back] | [-front, + back] |
|---|---|
| i, ĩ ,iː, ĩː | u, ũ, uː, ũː |
| ɪ, ɪ̃ | ʊ, ʊ̃ |
| e, ẽ | o, õ |
| æ, æ̃ | ɑ, ɑ̃, ɑː, ɑ̃ː |

Examples 35-42 form a minimal pair for vowels, such set of examples are used to demonstrate the phonemic system (vowels) and allophones of IBDs.

#### 2.1.2.1 Front vowels

Front vowels in IBDs are as follows:

(a) Phoneme /i/ is a high front vowel.
[+high, -low, +tense, +front, -back, -round]

The following examples show that /i/ is a separate phoneme in IBDs.

(35) Words with /i/ — Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /i/-/e/ | [giːr] | 'tar' | [ger] | 'crying a lot' |
| a.ii | /i/-/æ/ | [siːm] | 'wire' | [sæm] | 'poison' |
| a.iii | /i/-/o/ | [riːʃ] | 'beard' | [ros] | 'cooked' |
| a.iv | /i/-/ɑː/ | [phiːg] | 'fat' | [phɑːg] | 'religious cloths' |

(b) Phoneme /ɪ/ is a mid-high front vowel.
[+high, -low, -tense, +front, -back, -round]

The data in (36) show that /ɪ/ is a distinctive phoneme in Sarawani Balochi.

(36) Words with phoneme /ɪ/ — Words with other phonemes

| | | | | |
|---|---|---|---|---|
| /ɪ/-/ɑ/ | [nĩm] | 'name' | [nɑ̃ːm] | 'half' |
| /ɪ-/u/ | [khɪp] | 'bag' | [ khu:d] | 'fertilizer' |
| /ɪ/-/æ/ | [ʃɪp] | 'city near Sarawan' | [ʃæp] | 'night' |
| /ɪ/-/e/ | [bɪl] | 'shovel' | [del] | 'heart' |
| /ɪ/-/i/ | [ʃɪr] | 'milk' | [ʃiːr] | 'lion' |

(c) Phoneme /e/ is a mid-front vowel.
[- high, - low, + tense, +front, -back, -round]

As illustrated in (37), /e/ is a separate phoneme.

(37) Words with /e/ — Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /e/- /æ/ | [sek] | 'Indian', | [sækk] | 'hard' |
| a.ii | /e/- /u/ | [thel] | 'headband' | [thuːl] | 'length' |
| a.iv | /e/-/ɑ/ | [ʃẽn] | 'sand' | [ʃɑ̃ːn] | 'proud' |
| a.v | /e/-/o/ | [ges]' | house' | [go:ʃ] | 'ear' |

(d) Phoneme /æ/ is a low front vowel.
[-high, +low, +front, -back, -round]

The following minimal pairs display the phonemic position of /æ/ in IBDs phoneme inventory.

(38) Words with /æ/ — Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /æ/- /u/: | [thær] | 'it' | [thuːr] | 'net' |
| a.ii | /æ/- /o/: | [phæʈʈ] | 'field' | [phoʈʈ] | 'body hair' |
| a.iii | /æ/- /ɑ/: | [gæz] | 'manna tree, | [gɑːz] | 'gas' |

### 1.1.2.2 Back vowels

(a) Phoneme /u/ is a high back vowel.
[+high, +tense, -front, +back, +round]

The data in (39) show that /u/ is a separate phoneme in IBDs.

(39) Words with phoneme /u/ — Words with other phonemes

| | | | | |
|---|---|---|---|---|
| a.i | /u/- /o/ | [ʃuːr] 'salty' | [ʃoːr] | 'consultation' |
| a.ii | /u/- /o/ | [duːɹ] 'far' | [dorr] | 'Balochi earring' |

(b) Phoneme /ʊ/ is a mid-high back vowel.
[+high, -low, -tense, - front, +back, +round]

Minimal pairs in (40) illustrates that /ʊ/ is a separate phoneme in Sarawani Balochi.

(40) Words with phoneme/ʊ/ Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /ʊ/- /o/ | [mʊɖɖ] | ‘mood’ | [mod] | ‘fashion’ |
| a.ii | /ʊ/- /ɑ/ | [gʊr] | ‘grave’ | [gɑːr] | ‘grave’ |
| a.iii | /ʊ/- /u/ | [bʊr] | ‘ticks’ | [buːr] | ‘blond’ |

(c) Phoneme /o/ is a mid-back vowel.
[- high, -low, +tense, -front, +back, +round]

Phoneme /o/ has bees already compared with Front and Back vowels, data (41) show the comparison between phoneme /o/ and /ɑ/.

(41) Word with phoneme /o/ Word with other phoneme

| | | | | | |
|---|---|---|---|---|---|
| aii | /o/-/ɑ/ | [dʒo:h] | ’brook’ | [dʒɑ:h] | ‘place’ |

(d) Phoneme /ɑ/ is a low back vowel.
[-high, +low, -front, +back, -round]

Phoneme /ɑ/ has been already compared to all front and back vowels.

As table (42) illustrates, nasal vowels and long vowels exist in IBDs vowel inventory. Following examples show that all vowels in IBDs are realized as nasal vowel when they precede the nasal consonants, in fact the difference between oral and nasal vowels is not distinctive and they are allophonic variants. Moreover, long vowels occur in CV, CCVC and CVC syllables. Indeed when there is no moraic coda, since three moraic syllables is not allowed in IBDs. I will return to vowel distribution in the next chapter which deals with Suprasegmental phonology in Balochi.

(42) Words with oral vowels words with nasal vowels

| | | | | | |
|---|---|---|---|---|---|
| a.i | [phoːr] | ‘ash’ | b.i | [zõmm] | ‘dark’ |
| a.ii | [dɪh] | ‘beast’ | b.ii | [dɪ̃m] | ‘face’ |
| a.iii | [brɑːt] | ‘brother’ | b.iii | [hɑ̃ːm] | ‘raw’ |
| a.iv | [huːk] | ‘pig’ | b.iv | [bũːm] | ‘owl’ |
| a.v | [zæhg] | ‘child’ | b.v | [hæ̃ndʒiːɹ] | ‘fig’ |
| a.vi | [neʃɑ̃ːn] | ‘spot’ | b.vi | [gærdẽn] | ‘neck’ |

### 2.1.2.3 Diphthongs

(a) Phoneme /ie/ and Phoneme /ue/

/i/+/e/ → /ie/

/i/ [+high, -low, +tense, +front, -back, -round]

/e/ [- high, - low, + tense, +front, -back, -round]

These two phonemes (diphthongs) are only found in Sarhaddi Balochi data as in (43) and (44) respectively.

(43) Words with phoneme /ie/ — Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /ie/- /ɑː/ | [mieʃ] | ‘ei’ | [mɑːʃ] | ‘grass pea’ |
| a.ii | /ie/- /æ/ | [diẽm] | ‘face’ | [dæ̃m] | ‘steamed’ |
| a.iii | /ie/- /e/ | [lies] | ‘lick’ | [lejs] | ‘bald’ |
| a.iv | /ie/- /oː/ | [tʃ$^h$ieɹ] | ‘under’ | [tʃ$^h$oːɹ] | ‘stream’ |
| a.v | /ie/- /ue/ | [ʃieɹ] | ‘milk, lion’ | [ʃueɹ] | ‘salty’ |

(44) Words with /ue/ — Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /ue/- /ɑː/: | [huẽn] | ‘blood’, | [hɑ̃ːn] | ‘yes’ |
| a.ii | /ue/- /æ/: | [guedʒ] | ‘salamander’ | [gædʒdʒ] | ‘epileptic’ |
| a.iii | /ue/- /e/: | [t$^h$uel] | ‘to weigh’ | [t$^h$el] | ‘headband’ |

(b) Phoneme /ou/ and Phoneme /ei/

/o/ +/u/ → /ou/

/o/ [- high, -low, +tense, -front, +back, +round]

/u/ [+high, +tense, -front, +back, +round]

/e/ +/i/→ /ei/

/e/ [- high, - low, + tense, +front, -back, -round]

/i/ [+high, -low, +tense, +front, -back, -round]

These two diphthongs are only observed in Sarawani Balochi data. Following examples show that /ou/ and /ei/ are separate phonemes.

(45) Words with /ou/ Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /ou/-/i/ | [gouk] | 'part of head' | [giːr] | 'tar' |
| a.ii | /ou/-/e/ | [hour] | 'rain' | [herr] | 'donkey' |
| a.vi | /ou/-/o/ | [dʒour] | 'kind of tree' | [dʒoːh] | 'raceway' |
| a.ix | /ou/-/ɑ/ | [mout] | 'death' | [mɑːt] | 'mother' |
| a.x | /ou/-/ei/ | [hour]' | 'rain' | [heir] | 'goodness' |

Words with /ei/ Words with other phoneme

| | | | | | |
|---|---|---|---|---|---|
| b.i/ | /ei/-/i/ | [leip] | 'enjoyment' | [liːp] | 'brush' |
| b.ii | /ei/-/e/ | [leis] | 'bald' | [lek] | 'high, tall' |
| b.iii | /ei/-/æ/ | [iil] | 'loose' | [wæll] | 'melon' |

(c) Phoneme /iə/ and Phoneme /uə/ and Phoneme /æu/

/i/ +/ə/→ /iə/

/i/ [+high, -low, +tense, +front, -back, -round]

/ə/ [-high, -low, -tense, -front, -back, -round]

/u/ +/ə/→ /uə/

/u/ [+high, +tense, -front, +back, +round]

/ə/ [-high, -low, -tense, -front, -back, -round]

/æ/+/u/→ /æu/

/æ/ [-high, +low, +front, -back, -round]

/u/ [+high, +tense, -front, +back, +round]

These three diphthongs are only observed in Lashari Balochi data. Additionally, vowel /ə/ only occurs in diphthongs and not individually, such as examples in (46) and (47) and (48) correspondingly.

(46) Words with phoneme /uə/ Words with other phonemes

| | | | | | |
|---|---|---|---|---|---|
| a.i | /uə/-/ɑ/ | [duəg] | 'Dough' | [dɑːg] | 'warm' |
| a.ii | /uə/-/æ/ | [muər] | 'ant' | [næ̃m] | 'it' |
| a.iii | /uə/-/o/ | [guəʃ] | 'ear' | [godd] | 'cloth' |

(47) Words with phoneme /iə/ Words with other phonemes

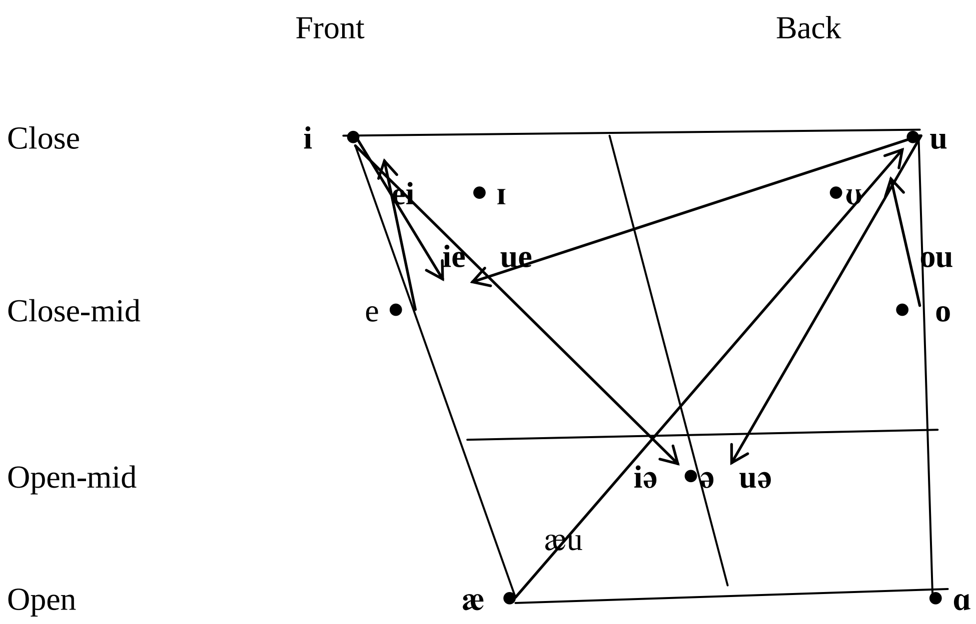
| | | | | | |
|---|---|---|---|---|---|
| a.i | /iə/-/i/ | [miəh] | 'nail' | [zĩːm] | 'scorpion' |
| a.ii | /iə/-/æ/ | [diər] | 'late' | [dær] | 'door' |
| a.iii | /iə/-/uə/ | [giliəp] | 'pot' | [guəʃ] | 'ear' |

(48)

| | | | | | | |
|---|---|---|---|---|---|---|
| Words with phoneme /æu/ | | | | Words with other phonemes | | |
| a.i | /æu/-/o/ | [kæuʃ] | ‘shoe’ | [kors] | ‘tablet’ |
| a.ii | /æu/-/æ/ | [kæul] | ‘promise’ | [kæbr] | ‘grave’ |
| a.iii | /æu/-/i/ | [dæur] | ‘throw’ | [diːr] | ‘late’ |
| a.iv | /æu/-/ɑ/ | [dʒæu] | ‘straw’ | [ʃɑːh] | ‘king’ |

Consequently, based on the above analyses which have been done on the vowels, the IBDs vowel inventory consists of 8 contrastive monophthongs and 7 diphthongs.

(49) IBDs Phonemes (vowels)




## 2.2 Iranian-Balochi dialects allophonic variations in optimality theory

As was illustrated already, Balochi has no lexical contrast of aspirated/ unaspirated stops and affricates, dorsal/coronal nasals, and oral/nasal vowels. So in this language aspirated and unaspirated stops and affricates, dorsal and coronal nasals, and oral and nasal vowels are allophones: They are predictable from the phonological contexts and do not reflect lexical specification (Hayes 2009).

The allophonic patterns can be stated in terms of violable constraints. In the languages, where phonetic contrast surface as allophonic and not lexically distinctive (such as that between aspirated or unaspirated stops in Balochi), the markedness constraints dominates faithfulness constraints, so the surface forms (output) are minimally marked by neutralizing the lexical contrasts. But when faithfulness dominates markedness, the lexical contrasts are expressed in the surface form (Kager, 1999: 29).

In the analysis of allophonic variation, three constraint types are involved: context- free markedness (MC-free), context- sensitive markedness (MC-sensitive), and faithfulness. Ranking (50) produces the typologically common sense of allophonic variation (Kager, 1999:34, 36)

(50) Allophonic variation
MC-sensitive >> MC- free >> Faithfulness

In this subsection, I will develop optimality- theoretic analyses of the allophonic variation in Balochi bases on the interaction of two basic kinds of constraints: markedness and faithfulness.

### 2.2.1 The distribution of aspirated stops and affricates in Iranian-Balochi dialects in OT

Considering aspirated voiceless stops and affricates (those sounds which are characterized by the feature [spread glottis]) in Balochi, there are certain positions in the word where it can occur and other positions where it cannot. Both aspirated stop and affricates surface mostly at the beginning of a syllable with primary or secondary stress whether that syllable is word-initial or elsewhere in the word. This is seen by the data in (51) where the (a) column shows stops and the (b) column aspirated affricate.

(51) At the beginning of a syllable with primary stress

| | | | | | | |
|---|---|---|---|---|---|---|
| a.i | *ʈiːń* | [ʈh] | ‘can’ | b.i | *roːtʃaːń* | [tʃh] | ‘days’ |
| a.ii | *poːŕ* | [ph] | ‘ash’ | b.ii | *tʃuːʃ́* | [tʃh] | ‘suck’ |
| a.iii | *kāll* | [kh] | ‘piece’ | | | | |
| a.iv | *taːḱ* | [th] | ‘window, leave’ | | | | |

The data in (52) show that aspiration can also occur as a first segment of word-initial onset cluster.

(52) As a first member of word-initial complex onset

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| a.i | *praːh* | [ph] | ‘wide’ | b.i | tʃlimp | *[tʃh]* | ‘water pipe’ |
| a.ii | *krues* | [kh] | ‘rooster’ | | | | |
| a.iii | *klieɭ* | [kh] | ‘lizard’ | | | | |

Moreover; the data in (53) illustrates that aspiration can also occur as part of the second position of an onset cluster.

(53) As a possible second member of complex onset

| | | | |
|---|---|---|---|
| a.i. | *spiːt* | [ph] | 'white' |
| a.ii | *bkæp* | [kh] | 'lay down!' |
| a.iii | *stim* | [th] | 'storm' |

Furthermore; aspiration surfaces at the beginning of the syllable with secondary stress as in (54).

(54) At the beginning of a syllable with secondary stress

| | | | |
|---|---|---|---|
| a.i. | *hǽptæ̀* | [th] | 'iek' |
| a.ii | *piéʈi* | [ʈh] | 'closet' |
| a.iii | *kæ̀rgʊéʃk* | [kh (in word-initial position)] | 'rabbit' |
| b.i | *pæ̀tʃǽg* | [ph] | 'to cook' |

Another position where aspiration occurs is in the onset position of stressless syllable. This is exemplified by the data in (55).

(55) At the beginning of medial stressless syllable.

| | | | |
|---|---|---|---|
| a.i. | *kæ̀lkoʃ*tǽg | [kh ( as the onset of second syllable)] | ' a kind of herb' |
| a.ii | kæ̀lpurækɑ́ːn | [ph] | ' a kind of herb' |
| a.iii | kæ̀ppægɑ́ː | [ph] | 'the act of hopping' |

Finally, the data in (56) illustrates that aspiration can occur in the word-final position as geminate consonant.

(56) Word-final position as geminate consonant

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| a.i | *gǽʈʈ* | [$ʈ^h$] | 'bite' | b.i | *letʃtʃ* | [$tʃ^h$] | 'mud' |
| a.ii | *tʃókk* | [$k^h$] | 'child' | | | | |
| a.iii | *kipp* | [$p^h$] | 'tight' | | | | |

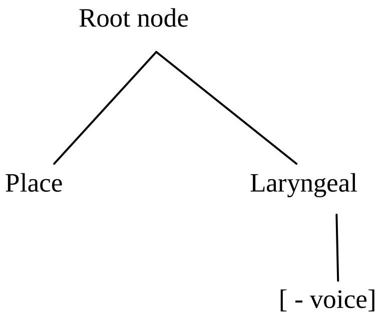
On the other hand there is an environment where aspiration does not occur. The data in (57) show that no aspiration surfaces in coda position (except as word-final geminate consonant). The words in (57a-b) all have voiceless stops and affricates respectively in coda position, but they are not realized as aspirated.

(57) In coda position aspiration does not surface

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| a.i | *saːp* | [p˺] | 'soft' | b.i | *metʃaːtʃ* | [tʃ˺] | 'eyelash |
| a.ii | *hæpt* | [p˺] [t˺] | 'seven' | b.ii | *pintʃ* | [tʃ˺] | 'nail' |
| a.iii | *hæps* | [p˺] | 'horse' | b.iii | *tætʃk* | [tʃ˺][k] | 'wide' |
| a.iv | *pliʃtok* | [k˺] | 'martin' | | | | |

Now, in this part I provide an analysis of the data in (51) - (57) based on OT. Before beginning, however, I first make clear my assumption regarding the feature-geometric representation of aspirated stops and affricates in Balochi. Where aspirated stops and affricates in Balochi are not phonemic; thus the feature [spread glottis] is not part of the underlying representation of aspirated stops and affricates, put differently; [spread glottis] is not underlyingly specified for the feature on voiceless stops or voiceless affricates. The underlying representation of a voiceless stop and voiceless affricate is shown in (58).

(58) Underlying representation of Balochi aspirated stops and affricate in feature geometry




As above data in (51) - (57) show, aspirated stops and affricate surface at the beginning of any syllable and not in coda position (except as word-final geminate stop or affricate). The constraint accounting for this, is the alignment constraint (context-sensitive) that aligns the feature [spread glottis] (henceforth [s.g.]) to the beginning of the word, shown in (59).

(59) ALIGN-L (σ, [s. g])
Align the left edge of syllable with the feature [s. g.]

The other important constraints for the analysis are the markedness constraints in (60) - (63) (both are from Davis and Cho 2003) which are (context-free) and the faithfulness constraints in (63) - (64).

(60) *[ s.g.]
The feature [s.g.] is prohibited

(61) *[s. g., +voice]
The feature [s.g.] cannot be realized on sounds that are [+ voice]

(62) *[s.g., +continuant]
Continuant sounds (fricatives) cannot be aspirated.

(63) IDENT- IO ([s.g.])
Input and output segments should be identical for aspiration.

(65) MAX- IO
Input segments must have output correspondents.
('No deletion')

Given these constraints, let us now consider their ranking in accounting for the distribution of aspirated stops and affricate in the data in (51) - (57). The first ranking is given in (65), in which the markedness constraint *[s. g., +voice] and *[s.g., +continuant] must outrank the alignment constraint. Based on this ranking, voiced sounds and continuant sounds are not allowed to surface as aspirated in Balochi even in an onset position.

(65) *[s. g., +voice], *[ s.g., +continuant] >> ALIGN-L (σ, [s. g])
The second ranking is given in (66), where the alignment constraint outranks the *[s.g.].

(66) ALIGN-L (σ, [s. g]) >> *[ s.g.]

In this ranking, unvoiced sounds are allowed to be aspirated in the beginning of the syllable.

Another crucial ranking is that the ALIGN-L (σ, [s. g]) constraint outranks both MAX-IO and IDENT- IO ([s.g.]) as in (67).

(67) ALIGN-L (σ, [s. g]) >> IDENT- IO ([s.g.]) >> MAX-IO

This ranking is necessary in order to prevent winning candidates with deleted segment(s) or unaspirated consonant(s).

The final ranking is given in (68).

(68) *[s. g., +voice],*[s.g., +continuant] >> ALIGN-L (σ, [s. g]) >> IDENT- IO ([s.g.]), *[s.g.] >>MAX-IO

This ranking is all that is needed for the analysis of the aspiration stops and affricates in Balochi. To show this, I will go through the sample tableaux for the data in (51) - (57). In all my OT analysis as discussed in chapter 2, I use the combination tableau (McCarthy2009) which includes information about violations as well as the W and L explanations of the comparative tableau. Furthermore, in all tableaux the cells with W and L tell us that the ranking constraints conflict over the choice of the winner. For the winner to win, the constraint with W must be ranked higher than the constraint with L.

Consider first, data in (51) - (52), where aspiration occurs at the word- initial position containing simple onset or complex onset with primary stress. The tableaux are given in (69) – (71).

| Input: /tɑ́ːk/ | *[s. g., +voice] | ALIGN-L (σ, [s. g]) | *[s.g.] | IDENT- IO ([s.g.]) | MAX-IO |
|---|---|---|---|---|---|
| a. ☞ $t^h$ɑ́ːk | | | * | * | |
| b. $t^h$ɑ́ː$k^h$ | | *W | **W | **W | |
| c. ɑ́ː$k^h$ | | *W | * W | *W | * W |
| d. tɑ́ːk | | *W | L | L | |

(69) /tɑ́ːk/ [$t^h$ɑ́ːk] ‘window, leaf’

(70) /prɑ́ːh/ [$p^h$rɑ́ːh] ‘wide’

| Input: /prɑ́ːh/ | *[s. g., +voice] | ALIGN-L (σ, [s. g]) | *[s.g.] | IDENT- IO ([s.g.]) | MAX-IO |
|---|---|---|---|---|---|
| a.☞ $p^h$rɑ́ːh | | * | * | * | |
| b. $p^h$$r^h$ɑ́ːh | * W | L | **W | **W | |
| c. $r^h$ɑ́ːh | *W | | | | * W |
| d. prɑ́ːh | | **W | | | |

(71) /stím/ [$st^h$ím] ’storm’

| Input: /stím/ | *[s. g., +continuant] | ALIGN-L (σ, [s. g]) | *[s.g.] | IDENT-IO([s.g.]) | MAX-IO |
|---|---|---|---|---|---|
| a.☞ $st^h$im | | * | * | * | |
| b. $s^h$$t^h$im | * W | L | **W | **W | |
| c. $s^h$im | *W | L | *W | *W | *W |
| d. stim | | **W | L | L | |

In the tableau (69) candidates (b), (c) and (d) loses out to candidate (a) because of their violation of ALIGN L (σ, [s. g]). In tableau (70), both candidate (b) and (c) violate the constraint *[s. g., +voice], because voiced sonorant consonant /r/surfaces as aspirated. In addition, candidate (d) violates ALIGN-L (σ, [s. g]). So, the candidate (a) is a winner. Likewise, in the comparison between the two candidate (b) and (c) in the tableau (71) with winner candidate (a), the two loser candidates violate the *[s. g., +continuant], because the fricative segment /s/ surfaces as aspirated. Further, candidate (d) violates ALIGN-L (σ, [s. g]). In the three tableaux, the (a) candidates violate IDENT- IO ([s.g.]) and*[s.g.], but this violation cannot be fatal given that (a) is the winning candidate.

Next consider the data like that in (54) and (55), where aspiration surfaces in the onset of syllable with secondary stress and at the beginning of word-medial stressless syllable respectively.

(72) /pæ̀tʃǽg/ [pʰæ̀tʃǽg] 'to cook'

| Input: /pæ̀tʃǽg/ | *[s. g., +voice] | ALIGN-L (σ, [s. g]) | *[s.g.] | IDENT- IO ([s.g.]) | MAX-IO |
|---|---|---|---|---|---|
| a.☞ pʰæ̀tʃʰǽg | | | ** | ** | |
| b. pæ̀tʃʰǽg | | *W | *L | *L | |
| c. æ̀tʃʰǽgʰ | *W | *W | ** | ** | *W |
| d. pæ̀tʃǽg | | **W | L | L | |

(73) /kæ̀lkoʃtǽg/ [kʰæ̀lkʰoʃtʰǽg] 'a kind of herb'

| Input: /kæ̀lkoʃtǽg/ | *[s. g., +voice] | ALIGN-L (σ, [s. g]) | *[s.g.] | IDENT- IO ([s.g.]) | MAX-IO |
|---|---|---|---|---|---|
| a.☞ kʰæ̀lkʰoʃtʰǽg | | | ***W | *** | |
| b. kʰæ̀lkoʃtʰ æg | | *W | **L | **L | |
| c. kʰæ̀lʰoʃtʰǽg | * W | | *** | *** | *W |
| d. kæ̀lkoʃtǽg | | ***W | | | |

As shown, the candidates in tableaux (72) and (73) consist of three syllables. The onsets of all three syllables are voiceless stops, and so can surface with the feature [s.g.]. Candidate (a) shows the aspirated stop at the beginning of the syllable. This allows for perfect satisfaction of two constraints *[s. g., +voice] and ALIGN-L (σ, [s. g]). However, as shown, the candidates (b) and (d) in (23) and (73) fatally violate the higher ranked ALIGN-L (σ, [s. g]) and so do not surface as aspirated stops. On the other hand, the candidate (c) in tableau (732 allows the voiced stop in coda position to be aspirated, which violates both *[s. g., +voice] and ALIGN-L (σ, [s. g]). Likewise, the candidate (c) in (73) aspirates the voiced sonorant consonant and deletes the word-medial onset. Thus, the (a) candidates win out since they best satisfy the constraints.

Now consider the data in (56), where the feature [s.g.] does not surface. As shown by data (56) the aspirated stops or affricate cannot occur in coda position. Tableau (74) illustrates the analysis accounts for this.

(74) /ʔæps/ [hæps] ‘horse’

| Input: /ʔæps/ | *[s. g., +continuant] | ALIGN-L (σ, [s. g]) | *[s.g.] | IDENT- IO ([s.g.]) | MAX_IO |
|---|---|---|---|---|---|
| a.☞ ʔæps | | * | | | |
| b. ʔæp$^h$s | | * | * W | *W | |

In the tableau (74), the second candidate has fatal violations of both IDENT-IO ([s.g.]) and

*[s.g.] constraints. In this analysis, to add aspiration into coda position is not allowed since aspiration occurs in the beginning of the syllable in Balochi.

### 2.2.2 The distribution of dorsal nasal [ŋ] in Iranian-Balochi dialects

In Iranian Balochi dialects, as in many languages, nasal assimilation is a common phonological process. Nasal consonants assimilate to the place of articulation of the following stops. Examples in (75) focus on the assimilation of the tautomorphemic coronal nasal to a following dorsal stop.

| | | | | |
|---|---|---|---|---|
| (75) | a.i. | *mængeliːk* | [mæ̃ŋgeliːk] | ‘bracelet’ |
| | a.ii | *hænguːr* | [hæŋguːr] | ‘grape’ |
| | a.iii | *ʈueng* | [ʈ$^h$ueŋg] | ‘knee’ |
| | a.iv | *bædræng* | [bædræŋg] | ‘cucumber’ |
| | b.i | *pællink* | [p$^h$ællĩŋk] | ‘plaints’ |
| | b.ii | *saːlonk* | [sɑːlõŋk] | ‘bride groom’ |
| | b.iii | *leʈiːnk* | [leʈĩːŋk] | ‘itching’ |

Data (75) show the occurrence of the dorsal nasal as a result of an assimilation of the coronal nasal to a following dorsal stop. So dorsal nasal [ŋ] stands in an allophonic relation to coronal nasal [n]. The distribution of [ŋ] is limited to coda position and only before dorsal stops.

The context-sensitive markedness constraint which accounts for the nasal assimilation is given in (76) (Fery, 2003):

(76) AGREE (Place) $_{\text{nasal+ stop}}$
The nasal must assimilate to the following stop consonant.

In dealing with the data containing nasal assimilation, I need to refer to a faithfulness constraint as well (Kager1999):

(77) IDENT-IO (Place)
Place features in the input and output are identical.

The constraint ranking in (78) will map input *ʈueng* onto output [ʈueŋg]:

(78) AGREE (Place) $_{\text{nasal+ stop}}$ >> IDENT-IO (Place)

This ranking shows the pattern just described: in Blochi a coronal nasal assimilates to the following dorsal stop and there is an allophonic relationship between [n] and [ŋ].

Consider the representation of ranking in (78) in the following tableau.

(79) *ʈueng* [ʈueŋg] 'knee'

| Input:/ʈueng/ | AGREE(Place) $_{\text{nasal+ sop}}$ | IDENT-IO (Place) |
|---|---|---|
| a. ☞ ʈueŋg | | * |
| b. ʈueng | *W | L |
| c. ʈuemg | *W | * |

Candidate (a) is optimal since it satisfies the undominated AGREE (Place) $_{\text{nasal+ stop}}$ at the expense of violation of IDENT- IO (Place), but both candidates (b) and (c) avoid the fulfillment of higher ranked constraint AGREE (Place) $_{\text{nasal+ stop}}$ so they are eliminated.

### 2.2.3 Vowel nasalization in Iranian-Balochi dialects

Vowels are generally oral in Balochi except when they directly precede a nasal consonant, in which they are nasal. This allophonic pattern occurs in all three dialects of Iranian Balochi; see the examples below:

| | | | | | | |
|---|---|---|---|---|---|---|
| (80) | a.i | *waːd* | 'salt' | b.i. | *tʃĩːntʃok* | 'pinky' |
| | a.ii | *ʈæp* | 'hollow' | b.ii | *lẽmp* | 'snot' |
| | a.iii | *pʊk* | 'empty' | b.iii | *dæ̃ntãːn* | 'tooth' |
| | a.iv | *læhm* | 'slow, soft' | b.iv | *ʔaːsũng* | 'sleeve' |

As data (80) illustrate, the variation between oral and nasal vowels in Balochi is totally context dependent and it does not reflect lexical specification. It means no word pairs occur that are distinguished by orality/ nasality of their vowels. So, there is an allophonic pattern between oral and nasal vowels in Iranian Balochi dialects.

The context-free markedness constraint in (81) is against nasal vowels (Kager1999):

(81) *$V_{NASAL}$
Vowels must not be nasal.

However, many languages such as Balochi tend to nasalize vowels before a tautosyllabic nasal constant. A context- sensitive markedness constraint which accounts for vowel nasalization is as follow (Kager 1999):

(82) *$V_{ORAL}$N
Before a nasal, vowels must not be oral.

The constraints in (83)-(84) require faithfulness to input nasality (c.f. McCarthy and Prince 1995).

(83) IDENT ([nasal])

Correspondening segments in input and output have identical values for [nasal].

(84) MAX-IO
Input segments must have output correspondents.
('No deletion')

Since the grammar of Balochi maps oral vowel to nasal vowel in a specific context, when they are preceded by nasal consonant, the context-sensitive markedness constraint (*$V_{ORAL}$N) must dominate the anti-nasal context–free markedness constraint (*$V_{NASAL}$) as well as the faithfulness constraints. This ranking result is shown in (85).

(85) *$V_{ORAL}$N, MAX-IO >> *$V_{NASAL,}$ IDENT ([nasal])

Tableaux (86) and (87) present a complete picture of the allophonic variation between oral and nasal vowels in Balochi.

(86) /lemp/ [lẽmp] 'snot'

| Input: /lemp/ | *$V_{ORAL}$N | MAX-IO | *$V_{NASAL}$ | IDENT ([nasal]) |
|---|---|---|---|---|
| a. ☞ lẽmp | | | * | * |
| b. lemp | *W | | L | L |
| c. lep | | *W | L | L |

(87) /wɑːd/ [wɑːd] ‘salt’

| Input: /wɑːd/ | *V$_{ORAL}$N | MAX-IO | *V$_{NASAL}$ | IDENT ([nasal]) |
|---|---|---|---|---|
| a. ☞ wɑːd | | | | |
| b. wɑ̃ːd | | | *W | *W |
| c. wɑː | | *W | | |

As shown in tableau (86), both candidate (b) and (c) have a violation of higher ranking constraint, *VORALN and MAX- IO respectively. Candidate (a) satisfies *VORALN, but has one violation of *VNASAL and one of IDENT ([nasal]). However, these violations cannot be fatal given that (a) is the winning candidate.

Candidate (b) in (87) violates both *VNASAL and *VNASAL. Candidate (c) has a higher ranked faithfulness constraint violation. The winner candidate is (a) since it fulfills all constraints and has no violation.

## 2.3 The distribution of retroflex consonants in Iranian-Balochi dialects: An OT approach

The phonemic systems of Iranian-Balochi dialects involve two retroflex stops [ʈ], [ɖ] and a retroflex flap [ɽ]. However, these consonants mostly occur in the Indic loanwords, but they are also found as a result of developments within the language (Jahani and Korn2009:643). Retroflex consonants occur infrequently cross-linguistically as for instance in Dravidian, Indo-Aryan , Munda and Australian languages (Hamann 2003, Arsenult 2012) and only 11% of languages have retroflex stops (Hamann2003:3), so it is worth to dedicate a subsection to investigate these types of specific stop consonants in Balochi. First some facts about the retroflex consonants are presented, and then the relevant analysis for the distribution of retroflex in Balochi is given in an optimality-theoretic framework.

The retroflexes are cross-linguistically marked. The complexity of their articulation is responsible for their markedness. The markedness of segment types within OT is shown by lower ranking the constraints which militate against the articulation of less complex segment than those which militate against the articulation of more complex segments as in (88) (Hamann2003):

(88) *RETROFLEX >> *ALVEOLAR

As above ranking presents, it can be said that retroflex segments are more marked than alveolar. In languages such as Balochi, the faithfulness constraints for segmental class is higher ranked than the markedness constraint *RETROFLEX, then retroflex consonants present in these languages.

Furthermore, Hamann (2005:3-6) shows that there is no evidence for perceptual markedness of retroflex, and the retroflex perceptibility is context-dependent. She gives the ranking of context-sensitive markedness constrains for retroflex perceptibility according to the cue availability in specific context as illustrated in the hierarchy in (89):

(89) *DELETE (R / V_V) >> *DELETE (R / V_C) >> *DELETE (R / C_V) >> *DELETE (R/C_C)

As can be seen in (89), retroflexes (R) are most perceptible in intervocalic context and least perceptible in inter-consonantal context. Moreover, Steriade in her approach 'licensing by cues' (Hamann 2003:151, 152) proposes cue distribution in retroflex stops. She shows that the intervocalic context and post-vocalic context provides more cues for retroflex stops, so in these positions retroflexes can be distinguished better from other apical consonants in pre-vocalic position. However, in post-consonant and post- pausal context retroflexes are least salient.

As was mentioned earlier in the present subsection, Iranian-Balochi dialects have two retroflex stops. The examples given below in (90) and (91) illustrate the distribution of retroflex stops /ɖ/ ad /ʈ/ respectively in three Iranian-Balochi dialects.

(90) The distribution of [ɖ] in Iranian-Balochi dialects

| | | | |
|---|---|---|---|
| a.i | *ɖa:l* | [ɖɑːl] | 'a kind of lentil' |
| a.ii | *ɖu:l* | [ɖuːl] | 'bucket' |
| a.iii | *ɖæng* | [ɖæ̃ŋg] | 'sting' |
| a.iv | *ɖuek* | [ɖuek] | 'stone' |
| b.i | *ɖæɖ* | [ɖæɖ] | 'fine, good' |
| b.ii | *peɖɖ* | [pʰeɖɖ] | 'pot belly' |
| b.iii | *koɖɖ* | [kʰoɖɖ] | 'small room' |
| b.iv | *gwanɖ* | [gwãnɖ] | 'small' |
| b.v | *tʃænɖeten* | [tʃʰæ̃nɖetẽn] | 'to move' |
| b.vi | *koɖɖæl* | [kʰoɖɖæl] | 'aviary' |

(91) The distribution of [ʈ] in Iranian-Balochi dialects

| | | | |
|---|---|---|---|
| a.i | *ʈi:læk* | [ʈʰiːlæk] | 'eye-ball' |
| a.ii | *ʈekk* | [ʈʰekʰk] | 'spot, freckle' |
| a.iii | *ʈuep* | [ʈʰuep] | 'ball' |
| a.iv | *ʈiel* | [ʈʰiel] | 'pomade' |
| b.i | *goʈʈ* | [goʈʰʈ] | 'neck' |
| b.ii | *gæ:ʈ* | [gæːʈ] | 'bite' |

| | | | |
|---|---|---|---|
| b.iii | *pieṭi* | [pʰieʈʰi] | 'cupboard' |
| b.iv | *kunṭ* | [kʰũnʈ] | 'palm bough' |
| b.v | *kuṭṭek* | [kʰuʈʈʰek] | 'watermelon' |

As examples in (90) and (91) show, retroflex stops are allowed in word-initial positions, see (91ai-av, 92ai-aiv); however, word-initial retroflex is disallowed in a number of Dravidian and Indo-Aryan languages (Hamann2003:117). Besides, in word-initial positions retroflex stops have a tendency not to occur pre- consonantal or post-consonantal, in other words they only occur in a simple onset and not complex. See (90a) an (91a) in all these examples retroflex stops appear as the simple onset of monomorphemic words. Another position where retroflex stops occur is in intervocalic context, see (90.b.vi) and (91.b.iii, b.v). Finally, retroflex stops occur in the coda position both in a simple coda, see (90. b.i, and 91.b.ii) or in the word-final cluster as the second component see (90.b.iv, and 91.b.iv). In addition as examples (91.bii, biii, and 92.b.i) display in the coda position retroflex stops occur as geminate stops. However, two interesting restrictions are observed in the distribution of retroflex stops in Iranian- Balochi dialects data. First, in the word-final cluster only alveolar nasal /n/ precedes the retroflex stops and no other segments. Second no retroflex occurs in the front vowel context, namely [iʈ] or [iɖ]. This avoidance can be observed in many languages, but it is not a universal principle (Hamann2003:92).

A third retroflex in the phoneme inventory of Iranian-Balochi as shown already is retroflex flap [ɽ]. Examples in (92) exemplify the distribution of [ɽ] in the three dialects of Iranian-Balochi.

(92) Distribution of [ɽ] in Iranian-Balochi dialects

| | | | |
|---|---|---|---|
| a.i | *ka:læɽ* | [kʰɑːlæɽ] | 'collar' |
| a.ii | *bu:ɽ* | [buːɽ] | 'louse' |
| a.iii | *ha:ɽ* | [hɑːɽ] | 'being together' |
| a.iv | *ga:ɽ* | [ɡɑːɽ] | 'ominous' |
| a.v | *klieṛ* | [kʰlieɽ] | 'lizard' |
| b.i | *leɽink* | [leɽ̃ink] | 'badly itching' |

The examples given above indicate that the retroflex flap occurs in the simple coda context see (92ai-av) and not in the coda cluster. Further, [ɽ] is found as word-medial onset in one example (92.bi). It seems that in Iranian-Balochi dialects no retroflex flap is allowed to occur in word-initial or intervocalic contexts. Besides, like retroflex stops, the front vowel is avoided by retroflex flap.

In the reminder of this subsection, an optimality-theoretic of the retroflex distribution in Iranian-Balochi dialects is sketched.

The lists of markedness constraints (both context-free and context- sensitive markedness constraints) and faithfulness constraints use in this analysis appear in (93), (94) and (95) respectively.

(93) The context- free markedness constrains (Hamann 2003:4)
 a. *RETROFLEX
 Retroflex segment are disallowed.
 b. *ALVEOLAR
 Alveolar segments are prohibited.

(94) Context-sensitive markedness constraints (constraint (a), Steriade, 2001a:240 and constraints (b) Hamann, 2003:5)
 a. V [_apical, stop] C
 The contrast between apical and retroflex stops is more salient in the V-C context.
 b. *DELETE (R / V_V)
 Deletion of retroflex segment in intervocalic context is not allowed.
 c. *DELETE (R / # _ V)
 Deletion of retroflex segment in word-initial position is not allowed.
 d. *DELETE (R / V_ #)
 Deletion of retroflex segment in word-final position is not allowed.

(95) Faithfulness constraint
 a. IDENT –IO (R)

Correspondent segments in input and output have identical values for [retroflex].

 b. MAX-IO
 ‘No deletion.

The rankings of markedness and faithfulness constraints for the data in (90), (91) and (92) are as follow:

(96) The constraints ranking for the distribution of retroflex stops in Balochi
 a. Word-initial retroflex stop
 *DELETE (R/ #_ V), *ALVEOLAR, IDENT-IO(R), MAX-IO >> *REROFLEX
 b. Inter-vocalic retroflex stop

*DELETE(R /V_V), IDENT-IO(R), *ALVEOLAR, MAX-IO>> *RETROFLEX

c. Post-consonant retroflex stop
V [_apical, stop] C >> IDENT-IO (R), *ALVEOLAR >> *RETROFLEX

d. Post-vocalic retroflex stop
*DELETE(R/V_ #), IDENT-IO (R), *ALVEOLAR>> *RETROFLEX

It is shown in all above rankings that retroflex stops are allowed in Balochi by lower ranking the *RETROFLEX and the higher ranking of the context-free markedness constraint *ALVEOLAR prevents the replacement of retroflex segment by apical one. In addition, the context–sensitive markedness constraints are undominated in all above rankings as well. The following tableaux present rankings in (97).

(97) *ɖuek* [ɖuek] 'stone'

| Input: /*ɖuek* / | *DELETE (R /#_ V) | IDENT-IO(R) | *ALVEOLAR | MAX_IO | *RETROFLEX |
|---|---|---|---|---|---|
| a.☞ ɖuek | | | | | * |
| b. uek | *W | *W | | *W | * |
| c. duek | *W | *W | *W | | L |

Candidate (b) in tableau (97) wins because it satisfies the undominated constraints namely *DELETE(R/ V_ #), ALVEOLAR and IDENT-IO(R). The other candidates fail on these three undominated constraints and are eliminated.

(98) *pieʈi* [pieʈi] 'cupboard'

| Input: /pieʈi/ | *DELETE (R / V_V) | IDENT-IO(R) | *ALVEOLAR | MAX_IO | *RETROFLEX |
|---|---|---|---|---|---|
| a. ☞ pieʈi | | | | | * |
| b. pieti | *W | *W | *W | *W | L |
| c. piei | *W | *W | | *W | L |

In tableau (98), the constraint against deleting the retroflex stop is higher ranked than the constraint requiring deleting retroflex segment. Candidate (a), with [ɽ], is thus optimal.

(99) *kunʈ* [kunʈ] ‘palm bough’

| Input:/kunʈ/ | V[apical, stop]C | IDENT-IO(R) | *RETROFLEX |
|---|---|---|---|
| a. ☞ kunʈ | | | * |
| b. kunt | | *W | L |
| c. kuɳʈ | *W | | **W |

Tableau (99) shows why *kunʈ* does not realize as [kuɳʈ], in other words why no assimilation happens between apical and retroflex segments. The undominated consonant V [apical, stop] C preserves the apical alveolar in post-vocalic context. Candidates (c) and (b) fulfill this higher ranked constraint, but candidate (b) is a loser since it violates the IDENT-IO (R). Candidate (a) violates the undominated constraint, thus it is eliminated. So, the winner candidate is (c).

(100) *buːɽ* [buːɻ] ‘louse’

| Input: /buːɽ / | *DELETE (R / V_#) | IDENT-IO(R) | *ALVEOLAR | MAX_IO | *RETROFLEX |
|---|---|---|---|---|---|
| a. ☞ buːɻ | | | | | * |
| b. buːr | *W | *W | *W | *W | L |
| c. buː | *W | *W | | *W | |

The tableau in (100) establishes that *DELETE(R / V_#) higher ranked than *RETROFLEX: the winning candidate (candidate a) has [ɻ] in word-final position, while the other two candidates have no retroflex consonants, they fatally violate the undominated constraints.

# Chapter (3):

## Suprasegmental and Prosodic Phonology of Iranian-Balochi Dialects

This chapter deals with the phonological units which extend over more than one sound segment in an utterance (suprasegments). First syllable structure in IBDs will be studied, since the syllable is a major element in describing phonotactic patterns in languages, and it is considered as a phonological unit which supplies a level of prosodic organization between segment and higher-level prosodic units. Then I will focus on the phonological behavior of geminate consonants in IBDs, since the term geminate refers to a long or double consonant, it can be discussed as a suprasegment unit in phonology. Furthermore, word stress patterns in IBDs will be discussed. All suprasegmental and prosodic topics which have been mentioned already will be analyzed by the analytical tools in OT.

I will proceed as follows. In section 3.1, we will become familiar with the syllable-internal structure in IBDs, including onsets, codas, nucleus, internal and final codas asymmetries, and IBDs' syllable weight system. This section will also introduce the OT approaches to analyze the observations on IBDs syllable structure such as obligatory onset, the structure of coda, syllable peak and word-initial onset clusters. In section 3.2, I will present the two types of geminate consonant in IBDs, namely final and intervocalic geminate. First the moraic representation of geminate will be given and then the OT approaches to IBDs geminate will be presented. Finally, section 3.3 will deal with the stress pattern system in IBDs, first the formal representation of stress pattern in metrical phonology will be given, and the relevant OT analysis for the position of primary stress in mono-morphemic words, compound words, and root with an affix will be discussed.

### 3.1 Syllabe-internal structure in Iranian-Balochi dialectes

#### 3.1.1 Introduction

The syllable is a prosodic category that orders segments in well-formed sequences according to their sonority values, it means that the syllable has a vowel (high sonorant segment) in the nucleus position which generally is preceded or followed by lower sonority segments, normally consonants (see Zec 2007). In the prosodic hierarchy, the syllable is located above segment and bellow word, so it is larger than the segments and smaller than the word (Zec

2007:162). Besides, the syllable is a main part of phonological generalization, and is connected with both segmental and suprasegmental levels (Fery and van de Vijver 2003).

Iranian-Balochi dialects have reasonably complex syllable structures, their syllable structures include open and close syllables and onset clusters and coda clusters as well: CV, CVC, CVVC, CCVC, CVCC and CCVCC. In addition, most words are monosyllabic or disyllabic and rarely trisyllabic. This section is organized as follows: in section 3.1.2. I describe the syllabic constituency in IBDs which includes the consonantal position (i.e. onset and rhyme); then the vowel distribution in the nucleus of the syllable structure, the syllable contact, Final consonants and internal codas asymmetry and finally syllable weight. Section3.1.3. investigates and analyses the IBDs syllable structure in OT.

### 3.1.2 Syllabic constituency in IBDs

#### 3.1.2.1 Onsets

This constituent seems obligatory in Balochi dialects, whenever the concatenation of morphemes would result in an onsetless syllable, epenthetic [ʔ][2]or [j] are inserted, as the following example demonstrates.

[2] LOMBARDI (2002:4) assumes that the glottal stop has a pharyngeal place specification and suggests that the hiera

[ʔ] insertion in a word-medial onset position

| | | | |
|---|---|---|---|
| a.i | *molla-ok* | [mollɑʔok] | ‘butterfly’ |
| a.ii | *do-om* | [doʔom] | ‘second’ |
| a.iii | *hædidʒæ-ok* | [hædidʒæʔok] | ‘ladybird’ |
| a.iv | *dʒola:-ok* | [dʒolɑː-ʔok] | ‘spider’ |
| b.i | *se:-om* | [seː-jõm] | ‘third’ |
| b.ii | *wa:dʒæ-i:* | [wɑːdʒæ-jiː] | ‘a man’ |
| b.iii | *distæ-i:* | [distæ-jiː] | ‘(s)he saw’ |

(1) shows that when a suffix starts with a vowel and the preceding stem ends with a vowel, a consonant [ʔ] or [j] are inserted as vowel hiatus resolution (I will discuss more about this phonological process in the next chapters). These obstruent consonants provide the following syllable with an onset. Moreover, [ʔ] mainly occurs in word-initial position before a vowel, given words like [ʔõmɪ] ‘age’, [ʔækl] ‘wisdom’, [ʔæ̃mb] ‘mango’,[ʔɑːpos] ‘cow in calf’.

Simple onsets can be filled by any consonant, with notable exceptions: the [ŋ] and [ɻ] can occur at the end of the word respectively like in zeng ‘bell’, klieɽ ‘lizard’, but not at the beginning *ngez or *ɻerkæbs.

Furthermore, word-initial consonant clusters are also allowed in IBDs, consider the following examples:

(2) Word-initial consonant clusters

| | | | |
|---|---|---|---|
| a.i | *tʃlimp* | [tʃ$^{h}$l̆imp] ‘bubble-bubble’ | |
| a.ii | *pli:ʃtok* | [p$^{h}$liʃt$^{h}$ok] | ‘martin’ |
| a.iii | *klieɻ* | [k$^{h}$lieɻ] | ‘lizard’ |
| a.iv | *blek* | [blek] | ‘write!’ |
| a.v | *gla:bi* | [glɑːbi] | ‘pink’ |
| b.i | *tʃra:g* | [tʃ$^{h}$rɑːg] | ‘light’ |
| b.ii | *bra:s* | [brɑːs] | ‘brother’ |
| b.iii | *kru:tʃ* | [k$^{h}$ruːtʃ] | ‘a kind of date’ |
| b.iv | *gru:g* | [gruːg] | ‘storm’ |
| b.v | *trond* | [t$^{h}$rõnd] | ‘rough’ |
| b.vi | *drueg* | [drueg] | ‘lie’ |
| b.vii | *pra:h* | [p$^{h}$rɑːh] | ‘wide’ |

---

rchy of ranked markedness constraints according to the place of articulation as proposed by PRINCE / SMOLENSKY (1993) should be modified to include *Phar in the rightmost position. This hierarchy is reproduced in as below.

*Lab, *Dor >> *Cor >> *Phar

With this hierarchy "/ʔ/ will be [the] optimal epenthetic consonant [and] its place markedness violation is even lower than that of the relatively unmarked /t/" (Naderi, van Oostendorp 2011:154).

| | | | |
|---|---|---|---|
| c.i | *ʃwa:næk* | [ʃwɑ̃:næk] | 'shepherd' |
| c.ii | *bwa:n* | [bwɑ̃:n] | 'read!' |
| c.iii | *gwær* | [gwær] | 'chest' |
| c.iv | *dwa:zdæh* | [dwɑ:zdæh] | 'tilve' |
| c.v | *dʒwa:n* | [dʒwɑ̃:n] | 'young' |
| c.vi | *swa:r* | [swɑ:r] | 'rider' |

Based on (2), I can draw the following table (+ denotes that a combination exists, **-** that it does not or is very marginal).

Table (3)

| $C_2$ / $C_1$ | l | r | w |
|---|---|---|---|
| P | + | + | – |
| b | + | + | – |
| d | – | + | + |
| t | – | + | + |
| k | + | + | – |
| g | – | + | + |
| dʒ | – | – | + |
| tʃ | + | – | – |
| s | – | – | + |
| ʃ | – | – | + |

Table (3) demonstrates that the first segment of a cluster is always a non-retroflex obstruent and the second consonant in a cluster is either one of the liquids [l, r] or the glide [w]. You can see that all cells are not filled in the table (3). In particular, the combinations [tl, dl,] and [pw, bw] are missing. Since [tl, dl] involve a coronal obstruent followed by a coronal liquid, and [pw, bw] involve a labial obstruent followed by a labial glide. In other words, Balochi onsets satisfy the following rule:

The two segments in the onset cannot have the same place of articulation with the exception of the [tr] combination.

Balochi onset clusters fit the theory of Sonority Sequencing Generalization (SSG). "SSG states the relative sonority within complex onsets: in a biconsonantal onset cluster, the second consonant should be more sonorant than the first." (Zec 2007:189). So within the onset, less sonorant consonants precede more sonorant consonant. In order to provide better explanations, consider the sonority scale (the early works of Sievers 1881):

(4) Sonority scale

obstruents < nasals < liquids < glides < vowels

| obstruents | nasals | liquids | glides | vowels |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

If I use the number in (4) and transfer them into columns of asterisk, the syllable structure of the word *grɑ̃ːn* 'heavy, expensive' can be represented as:

(5)

| | | | |
|---|---|---|---|
| | | * | |
| | | * | |
| | * | * | |
| | * | * | * |
| * | * | * | * |
| g | r | ɑː | N |
| 1 | 3 | 5 | 2 |

This structure shows that the segments before the nucleus (the highest element) gradually rise in sonority, whereas those following the nucleus (peak) fall.

In IBDs, [gr], [kr] are fine clusters, rising from the 1 of [g], [k] to the 3 of [r], but [gn] is not, and neither is any other cluster of obstruent and a following nasal.

The reason for this is that the dispersion between an obstruent and a nasal is not large enough, which can be explained by Minimal Sonority Distance (MSD) imposed on a pair of onset segments (Steriade 1982, Selkirk 1984a, Levins 1985, Baertsch 2002 among others). Based on the scale in (6), [g] is separated from [r] by two intervals, while only one interval separate [g] from [n]. The minimal sonority distance in the Balochi is at least two intervals. In sum, any two consonants that are at least two intervals apart can form a complex onset in Balochi.

(6) Sonority Distance

| O | N | L |
|---|---|---|
| 3 | 2 | 1 |

Zec (2007:189) gives the range of values for MSD, based on the scale in (6) as follows (O= obstruent, N= nasal, L= liquid):

a) MSD0 OO, NN, LL
b) MSD1 ON, NL

c) MSD2 OL

Sequences with flat sonority have the value MSD0, those with the steepest rise, MSD2, and the sequences with a less steep rise are given the value MSD1.

Balochi, which allows OL onset clusters, provides an example of a language with minimal sonority distance MSD2.

Thus, in Balochi both simple onsets and complex onsets are allowed. Moreover, in the onset cluster the less sonorant consonant precedes the more sonorant segment.

However, IBDs have number of word-initial clusters which violate the sonority sequencing generalization. These are words such as in (7).

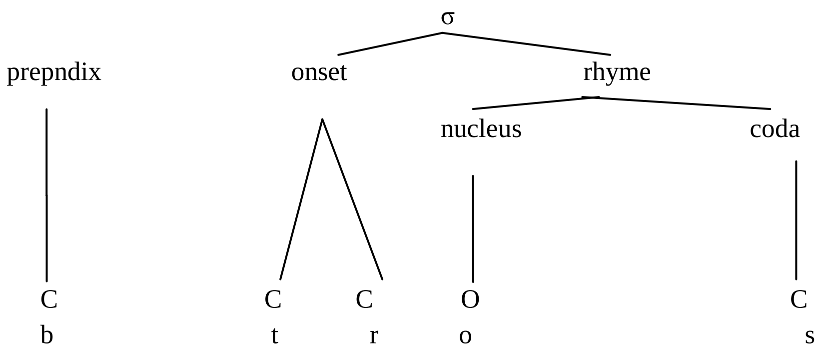
(7) word-initial consonant clusters against (SSG)

| | | | |
|---|---|---|---|
| a.i. | *spiːt* | [spʰiːt] | ‘white’ |
| a.ii | *spiʈʈ* | [spʰiʈʈ] | ‘speed’ |
| a.iii | *spænk* | [spʰæ̃nk] | ‘story’ |
| a.iv | *spæntaːn* | [spʰæ̃ntʰɑ̃ːn] | ‘wild rue’ |
| b.i | *pkæp* | [pkʰæp] | ‘fall down!’ |
| b.ii | *pkoʈʈ* | [pkʰoʈʈ] | ‘beat!’ |
| b.iii | *psuːtʃ* | [psuːtʃ] | ‘burn!’ |
| b.iv | *bzuːr* | [bzuːr] | ‘take!’ |
| b.v | *bguː* | [bguː] | ‘say!’ |

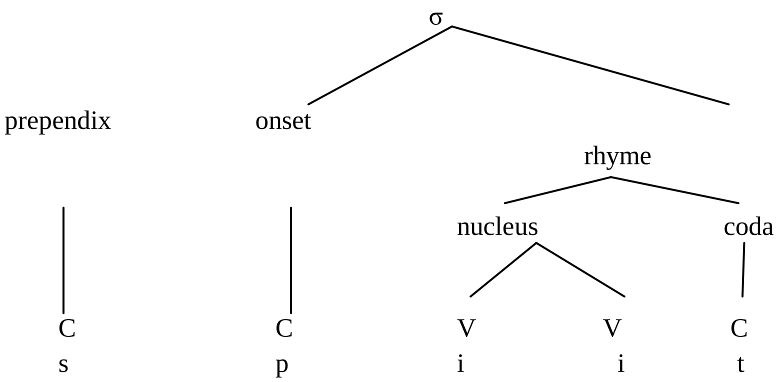
In examples 7(a.i- a.iv), coronal /s/ is followed by a plosive /t, p/. In addition in the imperative forms the prefix *b*- or *p*- adds to the present stem like in 7(b.i-b.v). Not only do these words all start with two obstruents, in spite of the demands on dispersion which Balochi data otherwise shows, but words like bgwæp ’knit!’ and ptrændʒ ‘hang!’ even start with three consonants.

One common strategy to explain such cases as in other languages such as English, Dutch and Greek is to consider the initial consonant of onset clusters (here in Balochi dialects s, p and b) not to be part of the core syllable, but to form a prependix which is considered to be outside the domain of normal syllabification process. This extra consonant has an extrasyllabicity property, i.e. not belonging to the syllable structure (Ein and van der Hulst**,** 2001:138,148). Thus words like *btros* ‘fear!’ and spiːt ‘white’ might have the following structures:

(8) I. *btros* [bt$^{h}$ros] ‘fear!’




II. spiːt [spiːt] ‘white’




Although medial sC can occur, *s* is in the coda and *c* in the onset of the second syllable and hence not a violation of the sonority hierarchy within one onset, as shown in (9).

(9) Medial sC in IBDs

| | | | |
|---|---|---|---|
| a.i | *daːstaːn* | [dɑːs] $_{σ}$ [t$^{h}$ɑ̃ːn] $_{σ}$ | ‘story’ |
| a.ii | *bæstæ* | [bæs] $_{σ}$ [t$^{h}$æ] $_{σ}$ | ‘box’ |
| a.iii | *ræstæg* | [ræs] $_{σ}$ [t$^{h}$æg] $_{σ}$ | ‘ripe’ |

The initial consonant of the medial cluster must be syllabified as a rhyme of the preceding syllable and the final consonant of the medial cluster belongs to the onset in the following syllable. In fact the medial clusters in (9) are heterosyllabic.

### 3.1.2. 2 Coda

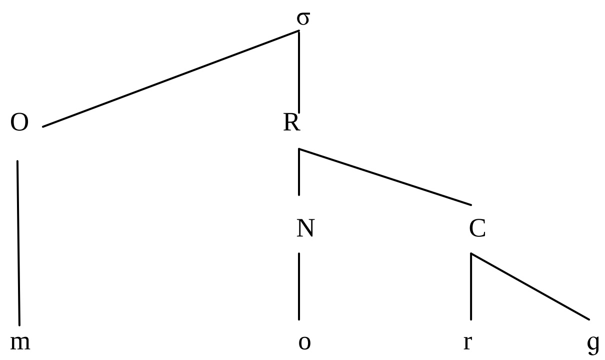
Now I turn to the coda position in IBDs. The data illustrate that every consonant can occur in this position, except [w] and [ʔ]: *ʃæh* 'king', *miːr* 'sir', *bɪl* 'dog', *taːs* 'bowl', *paːn* 'drug', *paːʈ* 'trick', *daːr* 'wood' etc. Furthermore, there are also final consonant clusters as in (10).

(10) word-final consonant clusters

| | | | |
|---|---|---|---|
| a.i | *lonɖ* | [lõnɖ] | 'fellow' |
| a.ii | *bænd* | [bæ̃nd] | 'rope' |
| a.iii | *ʈueng* | [ʈʰeng] | 'knee' |
| a.iv | *kelent* | [kʰelẽnt] | 'shovel' |
| a.v | *neginz* | [negĩnz] | 'lentil' |
| a.vi | *næmb* | [næ̃mb] | 'dew' |
| b.i | *kælb* | [kʰælb] | 'heart' |
| b.ii | *haːlg* | [hɑːlg] | 'peach' |
| b.iii | *hæjk* | [hæjk] | 'eyeball' |
| b.iv | *hord* | [hord] | 'small' |
| b.v | *morg* | [morg] | 'bird' |
| b.vi | *bærp* | [bærp] | 'snow' |

Examples in (10) and geminates in the word-final position are an evidence for Balochi having a complex coda. Consider following structure (O: onset, R: rhyme, N: nucleus and C: coda):

(11) *morg* [morg] 'bird, hen'



The sonority profile of the codas in (10) is always the same: a liquid or nasal followed by an obstruent. A coda cluster therefore is the mirror image of onset cluster. All final clusters in (10) support the sonority sequencing generalization in word-final position: within the coda, more sonorant consonants precede less sonorant consonants, excluding geminate here. (Ein and van der Hulst, 2001).

On the other hand, there are number of examples in IBDs that complex codas violate the sonority sequencing generalization in the coda position. Consider the following examples:

(12) word-final consonant clusters against (SSG)

| | | | |
|---|---|---|---|
| a.i | *dohl* | [dohl] | ‘kettledrum’ |
| a.ii | *pohl* | [pohl] | ‘bridge’ |
| a.iii | *tæhl* | [$t^h$æhl] | ‘bitter’ |
| a.iv | *ketl* | [$k^h$etl] | ‘kettle’ |
| a.v | *kosl* | [$k^h$osl] | ‘ablution’ |
| a.vi | *nogl* | [nogl] | ‘candy’ |
| a.vii | *ʔækl* | [ʔæ$k^h$l] | ‘wisdom’ |
| a.ix | *ɣopl,kobl* | [ɣopl], [$k^h$obl] | ‘lock’ |
| b.i | *zæhr* | [zæhr] | ‘bitter’ |
| b.ii | *sohr* | [sohr] | ‘red’ |
| b.iii | *mohr* | [mohr] | ‘tight’ |
| b.iv | *pekr* | [$p^h$ekr] | ‘thought’ |
| b.v | *kæbr* | [$k^h$æbr] | ‘grave’ |
| b.vi | ʔæsr | [ʔæsr] | ‘afternoon’ |
| c.i | *kæhn* | [$k^h$æhn] | ‘kanat’ |
| c.ii | *læhm* | [læhm] | ‘slow, soft’ |
| d.i | *kæbg* | [$k^h$æbg] | ‘partridge’ |
| d.ii | *hæpt* | [hæpt] | ‘seven’ |
| d.iii | *zatk* | [zɑtk] | ‘born’ |
| d.iv | *pæʈk* | [$p^h$æʈk] | ‘the sound of bullets’ |
| d.v | *zatk* | [zɑtk] | born’ |
| d.vi | pætk | [$p^h$ætk] | ‘cooked’ |

Based on examples in 12 (a-c), consider table (13):

(13)

| C2<br>C1 | l | r | n | m |
|---|---|---|---|---|
| h | + | + | + | + |
| t | + | - | - | - |
| s | + | + | - | - |
| g | + | - | - | - |
| k | + | + | - | - |
| b | + | + | - | - |
| p | + | - | - | - |

Table (13) shows that the first segment of the final clusters is a non-retroflex obstruent, and the second consonant in a cluster is either one of the liquids [l, r] or the nasals [n, m]. So, there is a sequence of obstruent/ sonorant which is an example of rising sonority with MSD2 values which is against the SSP.

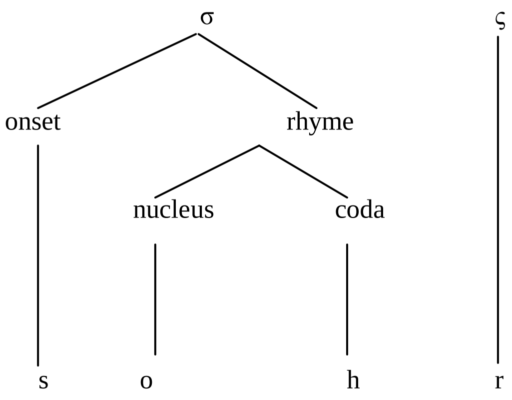
For dealing with SSP violations, there are number of proposals such as the core and affix, syllable appendix. (Yu Cho and Holloway King 2003). The present proposal in which I analyze the data in (12) relies on the notion of semisyllables. Semisyllables are syllables that have no mora. Semisyllables are known as degenerate syllable, minor syllables, headless syllables, and consonantal syllables. Properties of semisyllables are as follow (Yu Cho & Holloway king, 2003: 187):

(14) Properties of semisyllables

"a. No nucleus
b. No codas
c. No stress/accent/tone
d. Prosodically invisible
e. Well-formed onset clusters
f. Restricted to morpheme peripheral positions"

Semisyllables are defined as syllables that contain no mora. Sonority sequencing principle applies to consonant clusters including semisyllables, because they form a syllable which has an onset but no nucleus. Since there is no syllable peak, there is only rising sonority in semisyllables. While moraic full syllables are represented with regular sigma (σ), semisyllables represented with a final-position sigma (ς). The semisyllables in Balochi are restricted to the right edge of the word. The representation of the word *sohr* is as given in (15):

(15) *sohr* [sohr] ‘hot, red’




Moreover, in 12 (d) there are number of examples with the sequences of two obstruents

(stop+ stop) at coda position, they show flat sonority which has MSD0 values based on Zec (2007). Table (16) shows the plateau clusters in data12 (d).

(16)

| C2 C1 | g | k | t |
|---|---|---|---|
| b | + | - | - |
| p | - | - | + |
| t | - | + | - |
| ʈ | - | + | - |

Indeed, table (16) displays examples of harmonic clusters like [bg, tk, ʈk] which are formed by a sequence of [-dorsal][+ dorsal] stop (Yu Cho & Holloway King 2003). The harmonic clusters involve homogeneity of laryngeal features, non-homogeneous clusters of [-dorsal][+dorsal] are found in Balochi data as in *pg *bk *tg *ʈg just like in Georgian harmonic clusters (Yu Cho & Holloway King 2003).

Whereas coda clusters in data (12) show the falling sonority in coda clusters, the data (12d) are types of coda clusters with flat sonority.

### 3.1.2. 3 Nucleus

Considering rhymes to consist of two constituents, the nucleus and coda, in this subsection the distribution of vowels in the nucleus position in the syllable structure of IBDs is presented. Certain restrictions may exist in this distribution, something which needs to be described. The vowel distribution of IBDs is as follows:

(17) The distribution of vowels in IBDs

i. In all three dialects, an open syllable with a consonant, i.e. CV, both front and back monophthongs and diphthongs are observed.
ii. All vowels i.e. front, back and diphthongs can occur in the nucleus position of CVC syllable structure.
iii. In CCVC structure, all front and back vowels except /ɪ/ and /ʊ/can occur, and among diphthongs only /ou/ cannot occur in the nucleus position.
iv. All short front, back and diphthong except /ou/ can occur in the nucleus position of CVCC syllable.

In sum, Iranian-Balochi dialects are ones in which onset is obligatory and does not allow onsetless syllables, and all consonants except [ŋ,ɽ] can occur in an onset position. Moreover, codas are permitted, i.e. syllables maybe closed, all consonants except [w] can occur as coda. Furthermore, it allows complex onset and codas. In word-initial clusters, the first segment is generally an obstruent which is followed by a liquid or a glide. The second segment in the word-final clusters is normally an obstruent which is preceded by a liquid or a nasal. However, there are clusters in both word-initial and word-final positions which violate sonority sequencing generalization. I consider the first consonant of violated onset cluster as prependix and the final offending consonant of coda cluster as the semisyllable. They have extra-syllabicity property: not belonging to the syllable structure. Finally, only vowels are syllabic in IBDs.

### 3.1.3 Syllable contact (SC) in IBDs

Syllable contact laws favor a preceding coda be lower in sonority than the following onset (Davis1998, Gouskova 2004, among others). In other words, the hetero-syllabic cluster must have descending sonority. In this subsection the structure of the syllable contact (word-medial consonant clusters) in IBDs will be evaluated based on the syllable contact scale proposed by Zec (2007: 190). In scale (18) the sequences of flat sonority has SC0 value, sequences of rising sonority are given the value SC+1/+2, and those sequences with falling sonority have SC-1/-2 value. (O stand for obstruent, N stands for nasal and L stands for liquid)

(18) Syllabe Contact (SC)

| | |
|---|---|
| SC+2 | OL |
| SC+1 | ON, NL |
| SC0 | OO, NN, LL |

| | |
|---|---|
| SC-1 | LN, NO |
| SC-2 | LO |

As (18) shows the sequences of OL, ON and NL have positive values, so they are not preferred in word-medial cluster, while the syllable contact with negative values are highly preferred. Besides the sequences of OO, NN and LL have flat sonority.

Now consider the data in (19) which illustrate the syllable contact in IBDs. 19(a) is the sequence of N.O and L.O, 19(b) gives the sequence of L.O, and 19(c) presents the sequence of O.O.

(19) Syllable contact in IBDs

(a) Falling sonority N.O/ L.O

| | | | |
|---|---|---|---|
| a.i | *kaːmpæg* | [k$^{h}$ɑ̃ːm.p$^{h}$æg] | 'head' |
| a.ii | *dombiːtʃk* | [dõm.biːtʃk] | 'tail' |
| a.iii | *kuːnzæk* | [k$^{h}$ũːn.zæk] | 'heel' |
| a.iv | *tʃiːntʃok* | [tʃ$^{h}$ĩːn.tʃ$^{h}$ok] | 'pinky' |
| a.v | *hærgoʃk* | [hær.goʃk] | 'rabbit' |
| a.vi | *kaːrtʃok* | [k$^{h}$ɑːr.tʃ$^{h}$ok] | 'knife' |
| a.vii | *pelpel* | [p$^{h}$elp$^{h}$el] | 'pepper' |
| a.viii | *ʃælgom* | [ʃælgõm] | 'turnip' |

(b) Rising sonority O.N/ O.L

| | | | |
|---|---|---|---|
| b.i | *ʔasmaːn* | [ʔɑs.mɑ̃ːn] | 'sky' |
| b.i | *dokmæ* | [dok$^{h}$.mæ] | 'button' |
| b.iii | *kohnæg* | [k$^{h}$oh.næg] | 'old' |
| b.iv | *gehniːtʃ* | [geh.niːtʃ] | 'coriandre' |
| b.v | *pæhluːnk* | [p$^{h}$æh.lũːnk] | ' the side' |
| b.vi | *bæːdræng* | [bæːd.ræ̃ng] | 'cucumber' |
| b.vii | *sobræ* | [sob.ræ] | 'floor cloth' |
| b.viii | *megraːz* | [meg.rɑːz] | 'scissures' |

(c) Flat sonority O.O

| | | | |
|---|---|---|---|
| c.i | *kæptaːg* | [k$^{h}$æp.t$^{h}$ɑːg] | 'shoulder' |
| c.ii | *hoʃter* | [hoʃ.t$^{h}$er] | 'camel' |
| d.iii | *redʒgu* | [redʒ.gu] | 'marmot' |
| c,iv | *bæstæg* | [bæs.t$^{h}$æg] | 'yogurt' |
| c.v | *neʃtæg* | [neʃ.t$^{h}$æg] | 'single' |
| c,vi | *sohteg* | [soh.t$^{h}$eg] | 'burn' |

The data in (19) exhibit that Balochi is among the languages which admit all types of the heterosyllabic clusters. However, some languages like Sidamo (Zec 2007) are more restricted in this case and only prefer clusters in the negative range of syllable contact scale and disfavor clusters in the positive range of scale.

Furthermore, there is one more type of falling sonority syllable contact in IBDs which consists of the sequence of glide (G) and obstruent (O) as shown in (20).

(20) Falling sonority G. O

| | | | |
|---|---|---|---|
| a.i | *ʃejtaːn* | [ʃej.tɑ̃ːn] | 'evil' |
| a.ii | *zejtuːn* | [zej.tuːn] | 'olive' |
| a.iii | *mejdaːn* | [mejdɑ̃ːn] | 'square' |
| a.iv | *kejtʃiːn* | [kʰej.tʃʰĩːn] | 'scissor' |

### 3.1.3.1 Internal codas and final codas asymmetry in IBDs

As it has already been discussed, in IBDs both simple consonants and consonant clusters are allowed in the final position (coda) namely CVC and CVCC. However; data in (19) illustrates that medial clusters are heteroyllabic and there is no complex internal codas in IBDs, so only a CVC pattern is allowed word-internally and not CVCC. As the onsetless syllables are disallowed in Balochi, thus the second component of medial consonant clusters is considered as the onset of the following syllable. In fact, this is an argument for considering clusters in codas to involve semisyllables.

In some languages, final consonants and internal codas are symmetrical like Spanish, but in many languages final consonants shape in a different way than internal codas, so in these languages final consonants are referred as exceptional. Two reasons deal with the final coda exceptionality: (a) segmental immunity which allows more consonants in the final position than in the internal codas. (b) metrical invisibility which ignored the final consonants in the metrical process (Côté 2011: 848, 845). The segmental immunity occurs in IBDs. Whereas only one consonant is permitted in internal codas, two consonants may appear in final positions. Côté (2011) discuses five factors which trigger the segmental immunity: alignment, positional faithfulness, licensing parameters, perceptual factors and morphology.

Patterns in (21) postulate the number of consonantal slots in internal codas vs. final position, here the examples are ignored (Côté 2011:854).

(21)

| | Internal codas | Final position |
|---|---|---|
| a. | ø | C |
| b. | C | CC |

| | | |
|---|---|---|
| c. | ø | ø |
| d. | C | C |
| e. | C | ø |
| f. | CC | C |

Type (21a) and (21b) show languages that allow more consonants in final position, type (21c) and (21d) indicate the symmetrical languages and finally (21e) and (21f) identify the languages that permit more consonants in internal coda position(Côté).

Type (21b) is found in IBDs, which illustrates 'final immunity' effects. Consequently the set of permissible codas in final position, which include all consonants except [w] and [ʔ], is more than the number of consonants in medial coda. Likewise, complex codas are tolerated in final position and not in internal coda. (21) gives the list of final position consonants and internal coda consonants based on my data in IBDs:

| (22) | Internal coda consonants | Final coda consonants |
|---|---|---|
| | *P, b, d, k ,g,s,ʃ, h, dʒ* | *p, b, t, d, ʈ, ɖ, k, g, s, z, ʃ, ʒ, h,χ* |
| | *m, n, l, r, j* | *m, n, l, r, ɽ, j* |

### 3.1.4 Syllable weight system in IBDs

Syllable weight or syllable quantity is a concept based on the distinction between light (short) and heavy (long) syllables (Davis 2011). The moraic theory (Hyman 1985; Hayes 1989) is a representational theory of syllable weight. The mora represents the contrast between light and heavy syllables; a light syllable is monomoraic whereas heavy syllables are bimoraic. Based on Hayes theory (1989: 256-257) short vowels are underlyingly monomoraic whereas long vowels are bimoraic. As to geminate consonants, geminates are underlyingly moraic while single consonants are not moraic. However, in some languages the non-geminate coda gets moraic status by the rule of Wight-by-Position.

The moraic structure is language dependent. For example, in some languages CVV and CVC are heavy syllables while in others only CVV counts as heavy syllable (Hayes1989:255).

In Iranian-Balochi dialects the distinction between heavy and light syllables is simply a matter of the number of segments in the nucleus: branching nucleus syllables are heavy; non-branching nucleus syllables are light. Thus CV and CVC are light syllables, whereas CVV is the heavy syllable (Ein & van der

Hulst 2001:134-135). Besides, the “CVG”= word-final geminate[3] consonants are counted as heavy syllable in IBDs as well.

However, wight inconsistency occurs in IBDs. It means CVC syllables sometimes pattern as heavy syllable and sometimes as light. Therefore the weight of CVC syllables depends on the context within a word in IBDs. Context dependent weight is a quite common phenomenon like in Kashmiri (Davis2011:127).

In IBDs, context dependent weight of CVC syllables occurs in stress pattern system. Normally in IBDs’ rightmost CVV(C) syllable (bimoraic) gets the primary stress, but if a word has no CVV(C) syllables, then stress falls on the rightmost CVC syllable. (Soohani, Ahangar, van Oostendorp 2011). So this is an example of context dependent weight: a CVC syllable is bimoraic only in words without long vowels, more explanation and examples will be given in section (3.3) which deals with the stress pattern system in IBDs.

Moreover, Gordon (2000) proposes that the coda weight is predictable from syllable structure. As sonorant consonants have greater energy than obstruents and voiced segments have more phonetic energy than voiceless segments, the sonority and voicing of coda play important roles in the language specific weight of CVC. The results of evaluating coda consonants of 62 languages show that languages with light CVC syllable have lower [+voice] to [-voice] and [+sonorant] to [-sonorant] ratios coda consonants than the languages with heavy CVC syllables. Besides CVC syllables in languages with mismatches [+sonorant] to [-sonorant] and [+voice] to

[-voice] may either occur as heavy or light, and it is language–specific indeed (Gorden 2000:9, 14).

IBDs data support Gordon's hypothesis, the number of sonorant consonants in IBDs is less than the number of obstruents in coda position, but the number of voiced segments is more than the number of voiceless consonants in final position. As a result, Balochi is among languages with mismatching between these two features namely sonority and voicing. Thus the CVC syllable may be either heavy or light, as it has been already explained CVC syllable in IBDs is context dependent.

### 3.1.5 IBDs syllable structure in OT

This section gives the optimality analysis of the syllabic constituency in IBDs. First the data in (1) which deals with the consonant epenthesis in an onset position will be investigated. Second the analysis for the onset consonant clusters in data (2) and (7) will be given. Then the constraints for word-final consonants clusters as shown in data (10) and (12), and syllable contact as

[3] IBDs have two types of geminate: word-medial and word-final geminate consonants which are underlyingly moraic. It will be discussed in the next section.

clarified in examples (19) will be discussed, and the final analysis will examine the IBDs syllable weight in OT.

#### 3.1.5.1 Obligatory onset in IBDs: an OT approach

The fact that IBDs prefer consonant epenthesis in the empty onset position over onsetless syllables proves that onset is an obligatory component in IBDs. As discussed, glottal stop only occurs in an onset position before vowel. An OT analysis of epenthesis segment uses the following two constraints:

(23) ONSET
Syllables must have onsets.
(Price & Smolensky 1993)

(24) DEP-IO
Output segments must have input correspondents ‘No epenthesis’

The context-free markedness constraint, ONSET says that syllables must not start with vowel. And the anti-epenthesis faithfulness constraint DEP-IO prohibits segment epenthesis.

Epenthesis in onsets shows that IBDs rank DEP-IO below ONSET. Onset epenthesis involves the following ranking:

(25) ONSET >> DEP-IO

This ranking is demonstrated by the following tableau. It contains two candidates, which differ only in the presence versus the absence of an epenthetic consonant.

(26) *æmb* [ʔæmb] ‘mango’

| Input: /æmb | ONSET | DEP-IO |
|---|---|---|
| a.☞ ʔæmb | | * |
| b. *æmb* | *W | L |

Candidate (a) is a winner, since it satisfies the higher ranked ONSET by filling the onsetless position. But candidate (b) violates the undominated constraint and avoids [ʔ] insertion.

### 3.1.5.2 Word- initial onset clusters in IBDs: an OT approach

As data (1), (2) and (7) show, the onset clusters are allowed in IBDs as well as simple onsets. The onset clusters with rising sonority in (2) follow the sonority sequencing principle, as repeated in (27):

(27) onset-clusters with rising sonority

| | | |
|---|---|---|
| a.i | *tʃlimp* | 'hubble-bubble' |
| a.ii | *klieɽ* | 'lizard' |
| a.iii | *dʒwa:n* | 'young' |
| a.iv | *bwa:n* | 'read!' |
| a.v | *swa:r* | 'rider' |

Based on the sonority dispersion principle (cf. Parker 2011) the most natural onset clusters are obstruent + liquid, obstruent + glide and obstruent + nasal, while the least natural onset clusters are liquid + glide, nasal + liquid and nasal + glide. Dealing with examples in (27), word-initial clusters in IBDs are among natural onset clusters.

In OT, preference for rising sonority onset clusters is captured by ranking relevant Onset-well- Formedness constraints as in (28):

(28) Onset-well-Formedness constraints in IBDs

a. * $_\sigma$ [Sonorant^ Obstruent)
The sequence of sonorant- obstruent (falling sonority) in an onset position is not allowed. (Green 2003:239)

b. *COMPLEX
No complex syllable margins.
(cf. Prince and Smolensky 1993)

c. DEP-IO
Output segments must have input correspondents 'No epenthesis'

d. MAX- IO
Input consonants must have output correspondents 'No consonant deletion'
(cf.McCarthy2008)

(29) Onset cluster with rising sonority
* $_\sigma$ [Sonorant^ Obstruent), DEP-IO >> MAX-IO >>*COMPLEX

This ranking illustrates that rising sonority in onset cluster is achieved by ranking markedness constraints namely * $_\sigma$[Sonorant^ Obstruent), and SON-SEQ and also anti-epenthesis faithfulness constraint DEP-IO above the anti-deletion faithfulness constraint MAX-C and context-free markedness constraint *COMPLEX.

Tableau (30) evaluates candidates for the input /brɑːs/. Four candidates (30a-d) vary in their onset structure. Each of the candidates has at least one violation. Candidate (b) with reversing the onset sequence, fatally violates the undominated context-free markedness constraint * $_{\sigma}$ [Sonorant^ Obstruent). The remaining candidates (30c) and (30d) are also losers, as they violate the faithfulness constraints DEP-IO and MAX-IO, even though they satisfy the higher ranked constraints. The optimal candidate (30a) has one violation mark which is not fatal.

(30) *braːs* [brɑːs] 'brother'

| Input:/brɑːs/ | * $_{\sigma}$[Sonorant^ Obstruent) | DEP-IO | MAX-IO | *COMPLEX |
|---|---|---|---|---|
| a ☞ brɑːs | | | | * |
| b. rbɑːs | *W | | | * |
| c. berɑːs | | *W | | L |
| d. rɑːs | | | *W | L |

However, in data (7) examples with falling sonority and plateau sonority are exemplified. All initial-clusters in (7) are counterexamples to the sonority sequencing principle (SSP). The obstruent onset cluster in IBDs is a combination of fricative (F) and stops (S) as follows:

- FS: *staːr* 'star', *spiʈʈ* 'spped'
- SF *bhænd* 'laugh!', *psuːtʃ* 'burn!'
- SS *bkæp* 'fall down!', *pkoʈʈ* 'beat!'

Cross linguistically, the sequence of /s/ followed by a plosive is the most frequent exception to the SSP (Parker 2011). Morelli (2003) notes that in languages with plateaus onset clusters, four possible syllable onsets are attested as in Balochi: FS, SF, SS and FF. She claims that the 'least marked' of these types of clusters are FS and the' most marked' are SS. (31) expresses the marked relationship for obstruent clusters (Morelli2003:364).

(31) a. FS > FF
b. FS > SF > SS

So far, the list of onset-well-formedness constraints are given in (28).To also deal with the onset cluster with plateau sonority, the following two markedness constraints (cf. Morelli 2003) and one faithfulness constraint could be incorporated in our OT analysis.

(32) *PLATEU
Onset clusters with plateau sonority are not allowed.

(33) *SO
A tautosyllabic sequence of a stop followed by any obstruent in onset position is not allowed.

(34) IDENT (PLACE)
The place of articulation of an input segment must be preserved in its output correspondent. (cf.Kager1999)

The following rankings give the optimal outputs for the input /pkæp/ and /spiːt/ respectively:

(35) MAX-IO, IDENT (PLACE), DEP-IO >> *SO >> *COMPLEX

(36) MAX-IO, IDENT (PLACE), DEP-IO >> *PLATEAU>> *COMPLEX

In both rankings the faithfulness constraints govern all context-free markedness constraints against the plateau sonority. These rankings produce the output with SSG violation which seems to be allowed in IBDs.

Tableau (37) represents the sequence of SS as in /pkæp/. The optimal candidate is (37a), since it does not violate the undominated faithfulness constraints; however, it has two non-fatal violation marks. Both candidates (b) and (c) are losers. Candidate (b) has a fatal violation due to its segment deletion and candidate (c) is eliminated as it violates the higher ranked IDENT (Place) constraint, and finally the last losing candidate (d) violates the DEP-IO by epenthesising a vowel between two obstruent consonants.

(37) *pkæp* [pkæp] 'fall down!'

| Input:/pkæp/ | MAX-C | DEP-IO | IDENT(Place) | *SO | *COMPLEX |
|---|---|---|---|---|---|
| a. ☞ pkæp | | | | * | * |
| b. pæp | *W | | | L | L |
| c. præp | | | *W | L | * |
| d. pekæp | | *W | | L | L |

Tableau (38) shows the sequence of FS in the word-initial position as in /spiːt/. Candidate (b) is a loser, since it violates the anti-epenthesis faithfulness constraints. Besides, candidate (c) is not optimal as well, as it has a fatal violation mark. Candidate (d) violates the IDENT-(PLACE) by replacing the obstruent[t] by a sonorant [r], and also violates MAX-IO by deleting /s/. Thus, candidate (a) is a winner, as it satisfies all higher ranked constraints.

(38) s*pi:t* [spi:t] 'white'

| Input:/spi:t/ | MAX-IO | DEP-IO | IDENT (PLACE) | *PLATUE | *COMPLEX |
|---|---|---|---|---|---|
| a. ☞ spi:t | | | | * | * |
| b. sepi:t | | *W | | L | L |
| c. pi:t | *W | | | L | L |
| d. sri:t | *W | | *W | L | * |

### *3.1.5.3 An OT approach to IBDs coda clusters*

As data (10) and (12) show, the coda clusters are permitted in IBDs as well as simple coda. The coda clusters with falling sonority in (10) follow the sonority sequencing principle, but the examples in (12a, 12b and 12c) with rising sonority and in (12d) with flat sonority violate the SSG, as repeated in (40):

(39) Coda-clusters with falling, rising and flat sonority
a.i [hɑ:lg] 'peach'
a.ii [$p^h$ohl] 'bridge'
a.iii [hæpt] 'seven'

As it has been shown previously and illustrated in (39a.ii), the last segment of syllable - coda combination in IBDs has formed the semisyllable, it is a non-moraic syllable which contains only an onset and indeed no peak.

The OT analysis of examples in (39) uses three faithfulness constraints: DEP-IO, MAX-IO, and the anti-metathesis constraint namely LINEARITY-IO and, the alignment constraint as in (40).

(40) LINEARITY-IO
The output reflects the precedence structure of the input, and vice versa. (cf.Kager1999)

(41) ALIGNS-EDGE-ς
Align semisyllable to morpheme edge.

In addition, the remaining necessary constraints are markedness: *COMPLEX, SON-SEQ and *$C^{unsyll}$ (cf. McCarthy2008) which militate against the extrasyllabic consonants.

(42) *C$^{unseyll}$
Extra syllabic consonants are prohibited

The following rankings (43-45) of above constraints deal with the coda clusters with falling, flat and rising sonority respectively. In all rankings it seems ranking all constraints except *COMPLEX with respect to one another is totally irrelevant for the optimal output.

(43) Word-final coda clusters with falling and flat sonority
SON-SEQ, MAX-C, DEP-IO>> *COMPLEX

(44) Word-final coda clusters with flat sonority
MAX-C, DEP-IO, *C$^{unsyll}$ >> *COMPLEX

(45) Word-final coda clusters with rising sonority
LINEARITY, SON-SEQ, MAX-C, DEP-IO, ALIGN-EDGE ς >>COMPLEX

Now consider the succeeding tableaux which present the above rankings for the input [hɑlg], [hæpt] and [pohl] respectively.

(46) *ha:lg* [hɑlg] ‘peach’

| Input: /hɑlg/ | SON-SEQ | DEP-IO | MAX-C | *COMPLEX |
|---|---|---|---|---|
| a. ☞ hɑlg | | | | * |
| b. hɑleg | | *W | | L |
| c. hɑl | | | *W | L |
| d. hɑgl | *W | | | * |

(47) *hæpt* [hæpt] ‘seven’

| Input: /hæpt/ | MAX-C | DEP-IO | *C$^{unsyll}$ | *COMPLEX |
|---|---|---|---|---|
| a. ☞hæpt | | | | * |
| b. hæpet | | *W | | L |
| c. hæp | *W | | | L |
| d. hæp.t | | | *W | L |

(48) *pohl* [pohl] ‘bridge’

| Input:/pohl | LINEARITY | SON-SEQ | MAX-C | DEP-IO | ALIGN-EDGE ς | *Complex |
|---|---|---|---|---|---|---|
| a. ☞poh. l | | | | | | |
| b. pohl | | *W | | | *W | *W |
| c. pohel | | | | *W | *W | |
| d. poh | | | *W | | *W | |
| e. polh | *W | | | | *W | *W |

As shown in tableau (46), candidates (b) and (c) violate the higher ranking faithfulness constraints. Candidate (d) has one violation of the undominated constraint SON-SEQ and one violation of context-free markedness constraint namely *COMPLEX. Candidate (a) satisfies all undominated constraints and only violates *COMPLEX which is not fatal, so the winning candidate is (a).

In tableau (47), candidate (a) is a winner; it does not violate any higher ranked constraints while candidates (b), (c), and (d) all violate the higher ranked faithfulness constraints.

Finally, all candidates in tableau (48), except candidate (a), violate the ALIGN-EDGEς Moreover, candidate (b) violates higher ranked constraint SON-SEQ due to the sequence of rising/falling segments in coda cluster. Besides, both candidates (c) and (d) violate the faithfulness constraints DEP-IO and MAX-IO by inserting and deleting a consonant in the coda position respectively. Candidate (e) has a fatal violation; it has a metathesis in the coda cluster, so it violates the undominated faithfulness constraint LINEARITY. The optimal candidate is (a), which satisfies all constraints.

#### 3.1.5.4 IBDs Syllable peak in OT

The set of syllabic segments in the languages are different; it may include vowels, liquids, nasals and obstruents. As it has been discussed, the set of syllabic segments in IBDs only includes vowels. The sonority hierarchy of syllable peaks is given in (49).

(49) Sonority threshold on syllabicity
$\mu_h$ /V > $\mu_h$ / L > $\mu_h$ / N > $\mu_h$ / O
(Zec 2007)

The sonority hierarchy of syllable peaks in (49) illustrates a four-point peak hierarchy. The most sonorant segments (vowels) are above the sonority threshold, the second position is liquid and nasals are in the third point and the least sonorant segments (obstruents) are in the final point. Balochi is among languages whereby vowels are above the sonority threshold and not any other segments. However, there are languages such as IT Berber that allows not only vowels, but also liquids, nasals and even obstruents in the nucleus position (cf. Zec 2007).

In OT, the set of relevant constraint rankings deal with the syllabicity is as follows:

(50) Constraints on syllabicity (Prince and Smolensky 2004)
*$\mu_h$ /O >> *$\mu_h$ / N >> *$\mu_h$ / L >> * $\mu_h$ / V

(50) indicates that obstruents with less sonority are the most marked segments and vowels with high sonority are the least marked segments in the nucleus position.

The vowel preference in the nucleuses position in IBDs can be illustrated by ranking the context-free markedness constraint ONSET and faithfulness constraint DEP-IO above the constraint which bans the vocalic nuclei.

(51) ONSET, *$\mu_h$ / L, MAX-IO, DEP-IO >> * $\mu_h$ / V, *COMPLEX

Tableau (52) presents the above ranking for the input /gruːg/. Candidate (a) is the optimal candidate, since it prefers the vocalic nucleus over the liquid nucleus, though it has two violation marks which are not fatal. Candidate (b) and (c) are losers as they violate the undominated constraints ONSET and*$\mu_h$ / L by selecting the liquid nucleus which is not allowed in the IBDs.

(52) *gruːg* [gruːg] ‘storm’

| Input: /gruːg/ | ONSET | *$\mu_h$ / L | DEP-IO | * $\mu_h$ / V | *COMPLEX |
|---|---|---|---|---|---|
| a.☞ gruːg | | | | * | * |
| b. gr.uːg | *W | *W | | * | L |
| c. ge.r.uːg | *W | *W | *W | * | L |

### 3.1.5.5 IBDs syllable contact: an OT approach

Data in 19 (a), (b), and (c) provide evidence that all types of heterosyllabic clusters are found in IBDs: medial-clusters with falling, rising and flat sonority as in (53).

(53) Heterosyllabic cluster with falling, rising and flat sonority

| | | |
|---|---|---|
| a.i | [pelpel] | ‘pepper’ |
| a.ii | [sobræ] | ‘floor cloth’ |
| a.iii | [hoʃter] | ‘camel’ |

Examples like (53a.ii) show that Syllable Contact Law (SCL) which prefers descending sonority over the syllable boundary does not have strong influence on word-medial clusters with rising sonority. Conversely; in heterosyllabic clusters with falling sonority as in (53a.i), the SCL has a main role.

The role of SCL in OT is determined by outranking the SYLLCONT constraint (cf. Green2003) over other relevant constraints as given in (54).

(54) Ranking for falling sonority over syllable boundary
SYLLCONT>> *COMPLEX, ONS, MAX-C >> *$C^{unsyll}$

This ranking is supported by the following tableau of /pelpel/, which represents the medial-cluster with falling sonority.

(55) *pelpel* [pelpel] 'paper'

| Input: /pelpel/ | SYLLCONT | *COMPLEX | ONS | MAX-C | *C$^{unsyll}$ |
|---|---|---|---|---|---|
| a. ☞ pelpel | | | | | |
| b. pe.lel | | | | *W | |
| c. pelp.el | | *W | *W | | |
| d. pe .l. pel | | | | | *W |
| e. pe.lpel | | *W | | | |
| f. pep.lel | *W | | | | |

As tableau (55) proves, all candidates except candidate (a) have at least one violation marks. Thus, candidate (a) is the winner, and all other candidates are eliminated.

Considering the second type of word-medial cluster like in [sobræ], leads us to ranking (56). It deals with the word-medial clusters with rising sonority. This type of heterosyllabic clusters are against SCL. So, in ranking (56) SYLLCONT is not among undominated constraints.

(56) Ranking for rising sonority over syllable boundary
LINEARITY, MAX- C, *COMPLEX, ONS, *C$^{unsyll}$ >> SYLLCONT

Tableau (57) evaluates the candidates that match the input [sobræ]. Although all constraints have one violation, it is not fatal for candidate (a). It satisfies all undominated constraints and only violates the lower ranking SYLLCONT. Thus the optimal candidate is (a). All remaining candidates satisfy the SYLLCONT constraint at the expense of the violation of one of undominated constraints (LINEARITY, MAX-C, *COMPLEX, ONS, and *C$^{unsyll}$).

(57) *sobræ* [sobræ] 'floor cloths'

| Input:/sobræ/ | LINEARITY | MAX- C | *COMPLEX | ONS | *C$^{unsyll}$ | SYLLCONT |
|---|---|---|---|---|---|---|
| a. ☞ sob.ræ | | | | | | * |
| b. soræ | | *W | | | | L |
| c. sor.bæ | *W | | | | | L |
| d. sobr.æ | | | *W | *W | | L |
| e. so.bræ | | | *W | | | L |
| f. sob.r.æ | | | | *W | *W | * |

The Heterosyllabic cluster with flat sonority like in (53.iii) is the third type of word-medial cluster in IBDs. The relevant ranking is that in (58). As hierarchy shows, the SYLLCONT is dominated by other relevant undominated constraints just like in ranking (56). The illustration of it is offered in tableau (59).

(58) Ranking for flat sonority over syllable boundary
MAX- C, *COMPLEX, ONS, *$C^{unsyll}$ >> SYLLCONT

(59) *hoʃter* [hoʃter] 'camel'

| Input: /hoʃter/ | MAX-C | *COMPLEX | ONS | *$C^{unsyll}$ | SYLLCONT |
|---|---|---|---|---|---|
| a.☞ hoʃ.ter | | | | | * |
| b. hoter | *W | | | | L |
| c. hoʃt.er | | *W | *W | | L |
| d. ho.ʃter | | *W | | | L |
| e. hoʃ.t.er | | | *W | *W | * |

An optimal candidate is (a), which satisfies all undominated constraints and only violates the lower ranked SYLLCONT. Candidate (c) and (d) have complex coda and complex onset respectively which militate against the anti-complex cluster in syllable margins constraint; also candidate (c) has an extra violation mark. Candidate (b) deletes the first component of hetereosyllabic cluster so it is eliminated just like candidates (c) and (d). Finally, candidate (e) has the most violations and is a loser as well.

### 3.2 Consonant geminates in IBDs

#### 3.2.1 Introduction

This section attempts to identify and represents two different types of geminates, namely, the single vowel-adjacent geminate and the intervocalic geminate in Iranian-Balochi dialects. In addition, analyses of these geminate processes are given in the framework of OT.

Geminates normally refer to a long consonant that contrasts phonemically with its shorter or 'singleton' counterpart (Davis 2011). In IBDs, almost all singleton consonants have geminate counterparts. As data illustrate, geminates in IBDs are mostly in word-final position, where they are preceded only by short vowels. However, there are examples of intervocalic geminate, but no geminates occur in word-initial position as shown in (60) and (61) respectively.

In IBDs, besides 'true' geminates which are underlyingly long, there are also few examples of 'fake' geminate as well which will be discussed in the next chapter of the present thesis (for discussion of true and fake geminates, see e.g. Pycha 2010).

(60) Word-final geminate consonants

(I) Sonorants

| | | | |
|---|---|---|---|
| a.i | *tʃæmm* | [tʃæ̃mm] | 'eye' |
| a.ii | *ɖenn* | [dẽnn] | 'hill' |
| a.iii | *wæll* | [wæll] | 'kind of melon' |
| a.iv | bell | [bell] | 'permission' |
| a.v | *ʃærr* | [ʃærr] | 'good' |

(II) Obstruents

| | | | |
|---|---|---|---|
| a.i | g*æbb* | [gæbb] | 'bracelet' |
| a.ii | *kipp* | [kʰipʰp] | 'tight' |
| a.iii | *sædd* | [sædd] | 'dam' |
| a.iv | *bæɖɖ* | [bæɖɖ] | 'hug' |
| a.v | *loʈʈ* | [loʈʈ] | 'wood' |
| a.vi | *bægg* | [bægg] | 'cattle' |
| a.vii | *lokk* | [lokk] | 'short' |
| a.viii | *næzz* | [næzz] | 'squat' |
| a. ix | *hæʃʃ* | [hæʃʃ] | 'mill' |
| a.x | *gæʒʒ* | [gæʒʒ] | 'swallow' |
| a. xi | *toss* | [toss] | 'fart' |
| a. xii | *letʃtʃ* | [letʃtʃ] | 'mud' |
| a. xiii | *gædʒdʒ* | [gædʒdʒ] | 'spit' |

(61) Intervocalic geminate consonants

(I) Sonorants

| | | | |
|---|---|---|---|
| a.i | *pællink* | [pʰællĩnk] | 'pigtail' |
| a.ii | *bællok* | [bællok] | 'ancestor' |
| a.iii | *tʃællæ* | [tʃællæ] | 'ring' |
| a. iv | *henna* | [hẽnnɑ] | 'henna' |
| a. v | *dʒænnæt* | [dʒænnæt] | 'heaven' |

(II) Obstruents

| | | | |
|---|---|---|---|
| a.i | *wæssu* | [wæssu] | 'mother-in-law' |
| a.ii | *peʃʃok* | [pʰeʃʃok] | 'cat' |
| a.iii | *dʒækkæg* | [dʒækkʰæg] | 'cough' |
| a.iii | *hekkok* | [hekkʰok] | 'hiccup' |
| a.iv | *kossi* | [kʰossi] | 'wrestling' |
| a.v | *tuppan* | [tʰuppʰɑ̃n] | 'storm' |
| a.vi | *koɖɖæl* | [kʰoɖɖæl] | 'aviary ' |
| a.vii | *gætʃtʃæl* | [gætʃtʃʰæl] | 'bedridden' |

Examples in (60) and (61) demonstrate that in IBDs , as already mentioned , geminate consonants are mostly restricted to word-final position preceded by a short front vowel /i, e, æ/ or short mid-high back vowel /u/; also there are a number of intervocalic geminate consonants, but no word-initial geminate consonants have been observed in IBDs data. In addition, it seems almost all consonants, except for glides /j, w/ and / glottals /h, ʔ/, can appear as geminate consonant.

Overall table (62) summarizes the distribution of geminates in IBDs: single vowel–adjacent geminates including final geminates and intervocalic geminates are permitted, while non-vowel-adjacent geminates and initial geminates are disallowed.

(62) Distribution of geminates in IBDs

<table>
<tr><td>intervocalic geminate</td><td>VGGV</td><td rowspan="2">allowed</td></tr>
<tr><td rowspan="3">single vowel-adjacent geminates</td><td>VGG#</td></tr>
<tr><td>CGGV</td><td rowspan="3">not allowed</td></tr>
<tr><td>#GGV</td></tr>
<tr><td>non-vowel-adjacent geminates</td><td>#G +GC</td></tr>
</table>

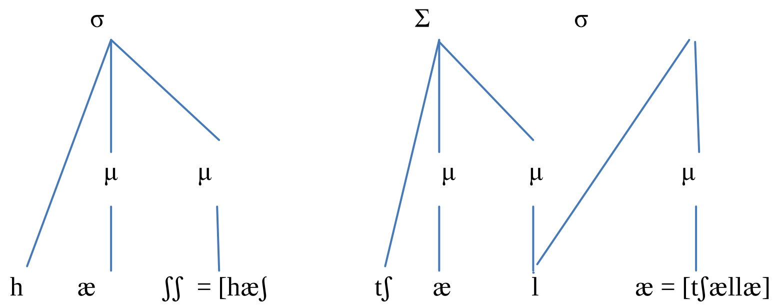
### 3.2.2 The moraic representation of geminate

'The moraic representation of geminate which is posited by Hayes (1989) is considered as the standard view of representation in current phonological works' (Davis, 2011:874). On this view, geminates are represented as underlyingly moraic or heavy; a geminate consonant differs from a short consonant in that the former is underlyingly moraic while the latter is non-moraic.

In (63) the moraic representation of *hæʃʃ* 'mill' as final geminate and *tʃællæ* 'ring' as intervocalic geminate is shown.

(63) Moraic representation of geminate in IBDs

a. *hæʃʃ* 'mill' b. *tʃællæ* 'ring'



As the data in (60) and (61) demonstrate, there is no geminate consonant preceded by a long vowel or a diphthong. Therefore; IBDs geminate consonants only occur after short vowels. This fact supports the cross-linguistically common phenomenon called 'avoiding trimoraic syllables' (Prince 1990).
against geminates is *GEM (Rose 2000). *GEM is considered as a family of constraints that target particular segmental type of geminates (Pajak2009), as illustrated in (64). The main idea of *GEM is that geminate obstruents typologically are more common than geminate sonorants at least in the intervocalic environment.

### 3.2.3 IBDs geminate in OT

In OT, the constraint which is used.

(64) *GEMGLIDE >> *GEMLIQUID >> *GEMNASAL >>*GEMOBS

The main idea in (64) is that the geminate obstruents are more common and perceptible than geminate sonorants, so the anti-sonorant geminate constraints are ranked over the anti-obstruent geminate constraints.

Moreover, typological evidence shows that geminates in intervocalic position are more usual than geminates which are non adjacent to any vowel (Muller 2001). This typological fact correlates with perceptual evidence, whereas intervocalic singleton-geminate contrasts are the most perceptible, non-vowel-adjacent singleton-geminate contrasts are the least perceptible (Pajak 2009).

As table (62) illustrates, vowel adjacency is an important property to define common geminate contexts in IBDs. This property can be shown in the framework of OT. Pajak (2009) gives the universal ranking of contextual constraints on geminates as shown in (65).

(65) *GEM / NVA >> *GEM /1VA >> *GEM / V_ V

Correspondingly, the constraint against non-vowel-adjacent geminates is ranked the highest, while the constraint against intervocalic geminates is ranked the lowest.

As to the IBDs data in (60) and (61), they follow the universal ranking constraints on geminates (65), where no initial geminate has been observed, while intervocalic and word-final geminates are allowed.

In analyzing the data in (60) and (61) the following context dependent markedness constraints are needed (Pajak 2009).

(66) *GEM / V_ V
'No intervocalic geminates'

(67) *GEM / 1VA
'No single vowel-adjacent (1VA) geminates'

In addition to the faithfulness constraints MAX-IO and DEP-IO, two more faithfulness constraints namely FAITH μ as in (68) and OCP as in (69) are involved in our analysis. As it is shown in (60) and (61) both types of geminates in IBDs are underlyingly moraic so, the FAITH μ is a constraint on moraic faithfulness which militates against mora insertion and deletion. OCP constraint is against the adjacency of two identical autosegments.

(68) FAITH μ
'No mora deletion or insertion'
(Davis 2003)

(69) OCP
At the melodic level, adjacent identical elements are prohibited
(Kager1999)

The full OT analysis of intervocalic geminates and single-vowel-adjacent geminates (word-final geminates) in IBDs are provided as follows.

(70) shows the constraints ranking for the intervocalic geminate as in /tʃællæ/. FAITH μ, and MAX-IO constraints are higher-ranked, so adding or deleting mora is prohibited. But two constraints OCP and *GEM / V_ V which are against geminate must be lower-ranked.

(70) Ranking for the intervocalic-geminate in IBDs
FAITH μ, MAX-IO >> OCP, *GEM/ V_V

Tableau (71) presents the above ranking for the input /tʃællæ/. The candidate (a) with intervocalic geminate, surfaces as optimal; because it satisfies both undominated constraints and it has non-fatal violations, whereas other candidates are eliminated by higher-ranked constraints namely FAITH μ and MAX-IO. The intervocalic-degeminated candidates (b) incur the violations of both undominated faithfulness constraints. Besides candidate (c) is a loser since it violates the MAX-IO and OCP by deleting the intervocalic consonant and vowel lengthening respectively. Finally, candidate (d) violates the undominated constraints FAITH μ and MAX-IO twice which is definitely fatal.

(71) μ μ μ — *tʃællæ* μ μ μ — [tʃællæ] 'ring'

| Input: /tʃællæ/ (μ μ μ) | FAITH μ | MAX-IO | OCP | *GEM/ V_V |
|---|---|---|---|---|
| a.☞ tʃællæ (μ μ μ) | | | * | * |
| b. tʃælæ (μ μ) | *W | *W | L | L |
| c. tʃæ:læ (μ μ μ) | | *W | * | |
| d. tʃæl (μ) | **W | **W | L | L |

Tableau (73) illustrates ranking (72) which deals with the word-final geminate as in /hæʃʃ/ in IBDs. Candidate (a) with word-final geminate is a winner candidate, but both degeminated candidates (b) and (c) violate the higher-ranked faithfulness constraints.

(72) Ranking for single-vowel-adjacent germinates
FAITH μ, MAX-IO, DEP-IO >> OCP, *GEM/1VA

μ μ

(73) *hæʃʃ* [hæʃʃ] 'mill'

| μ μ<br>input: /hæʃʃ/ | FAITH μ | MAX-IO | DEP-IO | OCP | *GEM/1VA |
|---|---|---|---|---|---|
| a.☞ μ μ<br>hæʃʃ | | | | * | * |
| b. μ<br>hæʃ | *W | *W | | L | L |
| c. μ μ<br>hæʃæʃ | | | *W | L | L |

As examples in (60) and (61) demonstrate, glottal segments and glides are not found as consonant germinate in word-final position. It is well known that guttural consonants (pharyngeals, laryngeals, uvulars) resist geminating in some Semitic languages (McCarthy 1994). It seems to be true for IBDs with glottal consonants [h,ʔ], as a subgroup of gutturals. Moreover, based on ranking in (64), geminate glides are more marked than geminate obstruents.

To account for a form like dɪh 'beast', a constraint preventing glottal geminate, *GEMGUTT, is necessary in addition to the OCP and FAIT μ , as well as familiar faithfulness constraints within correspondence theory such as MAXIO and DEP-IO. Hence, the following ranking against guttural geminates is demonstrated in tableau (75).

(74) Ranking for degeminated glottal consonants in word-final position
FAITH μ, * GEMGUTT, OCP, DEP-IO >> MAX- IO

μ
|
(75) *dɪh* [dɪh] 'beast'

| μ<br>\|<br>Input:/dɪh/ | FAITH μ | * GEMGUTT | OCP | DEP-IO | MAX-IO |
|---|---|---|---|---|---|
| a. ☞ μ<br>\|<br>dɪh | | | | | |
| b. μ μ<br>\| /<br>dɪhh | *W | *W | *W | *W | |
| c. μ<br>\|<br>dɪ | | | | | *W |
| d. μ μ μ<br>\| \| /<br>dɪhhɪ | *W | *W | *W | *W | |

As is shown in tableau (75), candidate (a) is an optimal output, since it does not violate any constraints, whereas for example, both candidates (b) and (d) violate all undominated constraints , though candidate (c) satisfies all higher-ranked constraints it has one violation, which is fatal.

Furthermore, in the case of degeminated glide consonants, the anti-geminate constraints *GEMGLIDE which prevents glide consonant geminates, is high ranked. Tableau (77) evaluates candidates for an input *dʒew* 'straw'. In this tableau, like tableau (75), the optimal output is candidate (b) which is degeminated and in fact does not violate any ranked constraints.

(76) Ranking for degeminated glide consonants in word-final position
FAITH μ, * GEMGLIDE, OCP, DEP-IO >> MAX- IO

(77) μ
*dʒew* [dʒow] ‘straw’

| μ<br>Input:/dʒew/ | FAITH μ | * GEMGLIDE | OCP | DEP-IO | MAX-IO |
|---|---|---|---|---|---|
| a. ☞ μ<br>dʒew | | | | | |
| b. μ μ<br>dʒeww | *W | *W | *W | *W | |
| c. μ<br>dʒe | | | | | *W |
| d. μ μ μ<br>dʒewi | *W | *W | *W | *W | |

The summary of the constraint ranking that accounts for the distribution of geminates in IBDs is provided in (78). The intervocalic geminates and single-vowel-adjacent germinates are allowed due to the low-ranked constraint *GEM/V_V and *GEM/1VA respectively. The glide and glottal consonants undergo degemination, which are assured by higher-ranking *GEMGUTT and *GEMGLIDE constraints.

(78) Constraint ranking responsible for the distribution of geminates in Sarawani Baloch

| | | |
|---|---|---|
| Intervocalic geminates | VGGV | FAITH μ, MAX-IO>> OCP, *GEM/ V_V |
| Single vowel-adjacent geminates | VGG# | FAITH μ, MAX-IO, DEP-IO >> OCP, *GEM/1VA |
| Word-final glottal consonants geminate | disallowed | FAITH μ, * GEMGUTT, OCP, DEP-IO >> MAX- IO |
| Word-final glide consonants geminate | disallowed | FAITH μ, * GEMGLIDE, OCP, DEP-IO >> MAX-IO |

Based on all data analyses which have been done in IBDs geminate consonants so far, it can be claimed that typologically Balochi is among languages in which geminate glide consonants are disallowed. While there are many examples of obstruents and liquid geminate consonants in both word-final and intervocalic positions, there are no geminate consonants in word-initial position.

## 3.3 The Stress Pattern System in IBDs

### 3.3.1 Introduction

The fact that stress is the linguistic manifestation of rhythmic structure is regarded as the central assumption of metrical stress theory (Liberman 1975; Liberman & Prince 1977; Hayes 1995). In stress languages, one or more syllables in each content word are more prominent than others. Most stress languages distinguish two degrees of stress: stress and unstressed. Cross-linguistically stressed syllables have higher pitch levels, longer duration, and greater loudness than unstressed syllables (Kager 2007).

In many languages stress is phonologically predictable; however, the morphological structure of words such as affixes may affect the position of stress, these languages are known as ‘fixed stress’ languages. Whereas, in ‘free stress’ languages, word stress is lexically contrastive, so there are minimal pairs which differ only in terms of stress such as in Russian (see Hayes 1995; Kager 2007).

Balochi is a stress language. The stress patterns in Balochi differ among its dialects; in Western dialects such as in Sarhaddi Balochi, the stress is on the last syllable of a word, while in Southern dialects as in Lashari Balochi the place of stress depends on the weight of the syllable and finally in Eastern Balochi like in Marri, the last heavy syllable of a word is stressed (Jahani & Korn 2009).

IBDs generally can be considered as Balochi dialects in which the placement of stress in mono-morphemic words is largely predictable, in regularly falling on the rightmost heavy syllable, so IBDs have the fixed stress system as illustrated by the forms in (79):

(79) Primary stress in IBDs

| | | | |
|---|---|---|---|
| a.i | *hændʒiːr* | [hæn.dʒiːˊr] | 'pigtail' |
| a.ii | *sobæk* | [so.bǽk] | 'light' |
| a.iii | *gohaːr* | [go.hɑːˊr] | 'sister' |

The present section consists of two subsections: Section (3.3.2) provides a description of the IBDs stress patterns based on metrical structure, section (3.3.3) gives an OT analysis of the linguistic data under investigation.

### 3.3.2 IBDs stress patterns: Metrical structure

In IBDs which stress placement is predictable, the segmental make-up of the syllables is relevant, as well as the position of a syllable in a word; thus heavy syllable likes to bear stress than light ones. The stress rules seek out a heavy syllable, so the stressed syllable is weight-sensitive. As discussed in section (3.1.4) the IBDs syllables types are as follows:

(80) Syllable types in IBDs

a. heavy: CV: ( C), CVG, CVCC

b. light: CV, CVC, CCVC

As listed in (80), the CVC syllable is considered as a light syllable, it has been also explained in section (3.1.4) that the CVC syllable in IBDs sometimes patterns as light and sometimes as heavy, so the weight of the CVC syllable is based on its context within a word; this phenomenon is known as context dependent weight. In IBDs, the rightmost CVV syllable attracts primary stress, but if a word has no bimoraic syllable (CVG or CVCC) then CVC syllable surfaces as heavy and receives primary stress as in (81).

(81) Context dependent weight in IBDs

| | | | |
|---|---|---|---|
| a.i | σ̀ σ́ | *bı̀biːˊ* | 'grandmother' |
| a.ii | σ̀ σ́ | *guèluːˊ* | 'calf' |
| a.iii | σ̀σ́ | *dʒòmaːˊ* | 'Friday' |
| a.iv | σ̀ σ́ | *kòruːˊs* | 'rooster' |
| a.v | σ̀σ̀ | *zæ̀gaːˊl* | 'carbon' |

| | | | |
|---|---|---|---|
| a.vi | σ́σ̀ | *baːkæ̀s* | ‘match’ |
| a.vii | σ́σ̀ | *tʃéːʃæ̀g* | ‘cough’ |
| a.viii | σ̀σ́ | *ʔàːsmáːn* | ‘sky’ |
| a.ix | σ̀σ́ | *ʔàːptáːb* | ‘sun light’ |
| b.i | σ́σ̀ | *káːhgèl* | ‘thatch’ |
| b.ii | σ̀σ́ | *hòrmáːg* | ‘date’ |
| b.iii | σ̀σ́ | *hæ̀ngúːr* | ‘grape’ |
| b.iv | σ́σ̀ | *tʃíːntʃòk* | ‘pinky’ |
| c.i | σ́σ̀ | *kòtʃǽk* | ‘dog’ |
| c.ii | σ́σ̀ | górdʒæ̀ | ‘tomato’ |
| c.iii | σ̀σ́ | sæ̀bǽt | ‘basket’ |
| c.iv | σ̀σ́ | gæ̀rσǽg | ‘core’ |
| c.v | σ̀σ́ | hòʃtér | ‘camel’ |
| d.i | σ́σ̀ | *báːlèʃt* | ‘pillow’ |
| d.ii | σ́σ̀ | *ʔáːďink* | ‘mirror’ |

The generalization illustrated by the stress patterns in (81) is that the presence of heavy syllables affects stress: in 81a (i, ii, iii, iv,v, xi, x ) or in 81b (i, ii, iii) mono-morphemic words ending in (CVV(C)) syllable receive final stress, whereas mono-morphemic words ending in the light syllable (CV) or (CVC) as in 81a (vi, vii) or 81b (i, iv) receive penultimate stress. However, in 81 (c.i- c.v) words do not have any (CVV(C)) syllables, so in the absence of long vowels, final CVC syllable becomes bimoraic and attracts the primary stress. 81d (i, ii) proves that CVV syllable is heavier than the CVCC syllable.

Moreover, if intervocalic geminate consonants occur in the mono-morphemic words then the penultimate CVC heavy syllable gets the stress like in 82a (i, ii, v) as discussed in section 3.2.2, geminate consonants are underlyingly moraic. Besides, in the mono-morphemic words with word-final consonant clusters, the main stress falls on final heavy syllable like in 82b (i, ii, iii) .There is an exception, though in 82b (iv, v), the primary stress falls on the penultimate heavy syllable and not in final CVCC syllable. It seems that in IBDs the CVV(C) syllable is heavier than CVCC and even CVG. Also I can conclude that CVG syllable is heavier than CVCC as in 82a (iv) Syllable.

(82) The primary stress in mono-morphemic words with intervocalic geminate or final clusters

| | | | |
|---|---|---|---|
| a.i | σ́σ̀ | *hénnà* | ‘henna’ |
| a.ii | σ́σ̀ | *gǽtʃtʃæ̀l* | ‘bed riders’ |
| a.iii | σ́σ̀ | *tʃǽllæ̀* | ‘ring’ |
| a.iv | σ̀σ́ | *pǽllȉnk* | ‘pigtail’ |

| | | | |
|---|---|---|---|
| a.v | σ́σ̀ | *kúʈʈèk* | ‘watermelon’ |
| b.i | σ̀σ́ | *bæ̀dræ̃ng* | ‘cucumber’ |
| b.ii | σ̀σ́ | *mæ̀sésk* | ‘fly’ |
| b.iii | σ̀σ́ | *hæ̀rgóʃk* | ‘rabbit’ |

Based on the data in (81) and (82), it can be concluded that the heavy syllable hierarchy in IBDs is as follow:

(83) IBDs heavy syllable hierarchy
CVV(C) > CVG> CVCC > CVC > CV

The analysis of IBDs stress is straightforward. In most cases the calculation of stress must go from right to left. The foot template allows at most two syllables and is right- strong, Hayes (1995) calls this foot template ‘iamb’.

The formal representation of IBDs stress in metrical phonology is given in (84) for the binary foot as in kælporækɑːn ‘name of a village near Sarawan, Iran’, and, unary foot as in hormɑːg ‘date’ and degenerate foot as in mɑ́ːt ‘mother’. The two layers of metrical structure are considered for each word. The first layer is ‘foot construction’ and the second layer is ‘word construction’. The difference between primary and secondary stress can be determined by these layers (Hayes1995). Throughout this section, I will use flattened bracketed grid representations as in Hayes (1995). ( ) denote the foot boundaries; /**.** / completely stressless syllables and /× / stressed syllables.

(84) The formal representation of stress in IBDs

| | | | | |
|---|---|---|---|---|
| a. | (× ) . (. ×) | b. (. ×) | c. (×) | Foot |
| | σ σ σ σ | σ σ | σ | Construction |
| | *kæ̀lpo ræ kaːń* | *hòrmaːǵ maːt* | | |
| | (. ×) | (. ×) | (×) | Word Layer |
| | (×) (. ×) | (. ×) | (×) | Construction |
| | σ σ σ σ | σ σ | σ | |
| | kæ̀lpo ræ kɑ́ːn | hòrmɑ́ːg | *maːt* | |

Now consider the representation of three syllabic mono-morphemic words as in *dʒæræmbɪk* ‘tarantula’, and *portægaːl* ‘orange’, indeed the final conclusion about the direction of foot construction in IBDs can be made based on (84) and (85 ).

(85) Foot construction in three syllabic words

| | | | | |
|---|---|---|---|---|
| a. | (. ×) (×) | b. | (×) (. ×) | Foot |
| | σ σ σ | | σ σ σ | Construction |
| | *dʒæræmbɪk* | | *portægaːl* | |
| | ( . ×) | | (. ×) | Word Layer |
| | (. ×) ( ×) | | (×) (. ×) | Construction |
| | σ σσ | | σ σσ | *dʒæræmbɪk* |
| | | | | *portægaːl* |

It seems that for making iambs in IBDs, we should go from left to right, and the final syllable attracts the primary stress. So IBDs have rightward iambs.

However, examples (86) appear to disagree with with iambic foot construction in IBDs:

(86) Primary stress in negative and prohibitive verb forms

| | | |
|---|---|---|
| a.i | *mǽ-wær* | 'Don't eat!' |
| | Prohibitive marker-eat | |
| a.ii | *mǽ-jaː* | 'Don't come!' |
| | Prohibitive marker- come | |
| a.iii | *mǽ-luʈʈ* | 'Don't want' |
| | Prohibitive marker- want | |
| a.iv | *nǽ -waːrt* | '(s)he does not eat.' |
| | Negative marker- eat-Present.3SG | |
| a.v | *nǽ -hændaːn* | 'I do not laugh' |
| | Negative marker- laugh-Present.1SG | |

(86) demonstrates that, the first light syllable, which is a prefix, gets the primary stress. That difference shows that morphology can also play a role in the stress system of the word: those in (81) and (82) are mono-morphemic words, while the words in (86) are complex words. Thus, *næ* and *mæ* are accent-bearing affixes; they override the stress pattern of the original morpheme and attract the primary stress.

Alderete (1999) considers two types of morphological influence on stress and pitch accent: (1) root-controlled accent and affix-controlled accent. In root-controlled stress, the root accent overrides the affix accent, but in affix-controlled accent, the presence of the particular affix triggers stem accent to be deleted, inserted or shifted. Thus, data in (86) exemplified the affix-controlled accent; in these examples indeed affix overrides the stem accent by shifting the primary stress to itself.

Now this question may be raised: 'Does Morphology govern the accent in IBDs?' or in other words, 'Does word structure in IBDs affect the phonological categories like stress?' To find the accurate ansir, let us examine more roots with other affixes in IBDs.

In (87), the position of primary stress in roots and affixes is shown. Indeed, in all examples, it is only phonology which governs the accent, and the default accentual structure is preserved no matter whether it is root or affix: if there is a long vowel then it is stressed as in 87(I), (II: a.iii, a.iv), (III: a.iii), (IV: a.i), and (V), in which final or penultimate heavy syllable (CVVC) gets the primary stress, otherwise final CVC syllable surfaces as heavy and attracts the primary stress as in 87(II:a.i, a.ii), (III: a.i), and (IV: a.v). Furthermore, in 87(I: a.iii) and (II: a.iii), the penultimate CVG as bimoraic syllable has primary stress.

(87)

| | | | |
|---|---|---|---|
| (I) | - *aːn* (plural marker) | | |
| | a.i | *drǽhtʃ+aːn →   drætaː́n* | 'trees' |
| | a.ii | *ʈiː́læk   + aːn →ʈiːlækaː́n* | 'eye-balls' |
| | a.iii | *kúʈʈek + aː́n →kuʈʈekaː́n* | 'watermelons' |
| (II) | – *en,-æg* (infinitive marker) | | |
| | a.i | *hoʃké+ten → hoʃketén* | 'to hear' |
| | a.ii | *dʒǽn+ǽg → dʒænǽg* | 'to hit' |
| | a.iii | *dáːnt+ en→daː́nten* | 'to know' |
| | a.iv | *leː́tʃen+æg→leː́tʃenæg* | 'to stick' |
| (III) | –*ok* (diminutive marker) | | |
| | a.i | *dohtǽr+ok → dohtærók* | 'young girl' |
| | a.ii | *miéh+ok →miéhok* | 'small nail' |
| | a.iii | *ṕotʃˈtʃ+ok →pótʃtʃok* | 'small cloth' |
| (IV) | – *ter* (comparative marker) | | |
| | a.i | *ʈuː́h+ter →ʈuː́hter* | 'bigger' |
| | a.ii | *séll+tér → séllter* | 'worse' |
| | a.iii | *wǽʃʃ+ter →wǽʃʃter* | 'better' |
| | a.iv | *tǽhl+ter →tǽhlter* | 'bitterer' |
| | a.v | *sobǽk+tér → sobæktér* | 'lighter' |
| (V) | *-terien/ teriːn/teriən* (superlative marker) | | |
| | a.i | *laː́ger+teriːn →laːgerteriː́n* | 'thinnest' |
| | a.ii | *sǽkk+terién →sækkterién* | 'roughest' |
| | a.iii | *haː́mæg+teriːn →haːmægteriː́n* | 'raist' |
| | a.iv | *ʃólleg +teriən   → ʃollegteriə́n* | 'weakest' |

Having discussed affixation, now I turn to compounding in IBDs. Compounds are morphologically complex units that include two or more lexemes. Compounds in IBDs typically have a Strong (S) weak (W) pattern. It means the primary stress of the entire compound falls on the primary stressed syllable of the first item of the compound and any other following stressed syllables bear the secondary stress. The compounds below in (88) show that this pattern holds regardless of the word categories of compound items, or the number of syllables in each item. It also does not matter whether the compound is endocentric (the semantic head is the second component of compounds) or exocentric (the semantic head is not part of the compounds itself).

(88) The primary stress in IBDs compounds

(I) Noun + Noun

a.i *braː́+zæ̋hk →* *braː́zæ̀hk* 'nephew'
[[brother]$_N$[born]$_N$]]$_N$
(exocentric)

a.ii *bő́n+bæ̋llok → bő́nbæ̀llok* 'grand grandmother'
[[root]$_N$[grandmother]$_N$]]$_N$
(endocentric)

a.iii *pæ̋ntʃ+ʃæm̋mæ →pæ̋ntʃʃæ̀mmæ* 'Thursday'
[[five] $_N$ [Saturday] $_N$]$_N$
(exocentric)

a.iv *tʃaː́r+ʃaːnæg →tʃáːrʃàːnæg* 'strong man'
[[four]$_N$[shoulder]$_N$]$_{ADJ}$
(exocentric)

(II) Noun + Adjective

a.i *sijaː́h+ dél→sijaː́hdèl* 'stone heart'
[[heart]N[black]ADJ]ADJ
(exocentric)

(III) Noun + Verb

a.i *gæ̋ʈʈ+geptén →gæ̋ʈʈgeptèn* 'to bite'
[[bite] $_N$ [to get] $_{stem}$]$_V$
(endocentric)

a.ii *waː́b+giː́ndæg → waː́bgiː̀ndæg* 'to dream'
[[sleep] $_N$ [to see] $_{stem}$]V
(endocentric)

In (89), the metrical representations for *gæ̋ʈʈ geptèn, sijaː́hdèl and bő́nbæ̀llok* are presented. The primary stress falls on the heavy syllable of first component of compound.

(89) Metrical representation of compound stress in IBDs

a. (×) (. ×) b. (. ×) (×) c. (×) (×) Foot
σ σσ σ σ σ σ σ σConstruction

*gǽʈʈ geptén* *sijaːh dél* *bón bǽllok*

( ×)(. ×) ( . ×) (×) (×) (×) Word Layer
(×) (. ×) (. ×) ( ×) (×) (×) . Construction
σ σ σ σ σ σ σ σ σ

*gǽʈʈ geptén* *sijaːh dél* *bón bǽllok*

(× . ) (× .) (× .) Compound-
(×) (. ×) (. ×) (×) (×) (×) word Layer
( ×)(. ×) ( . ×)(×) (×) (×) Construction
σ σ σ σ σ σ σ σ σ

*gǽʈʈ geptèn* *sijaːh dèl* *bónbællòk*

Furthermore, the distribution of stress in verb forms occurs in the following way:

(a) In the simple present and present perfect like in examples (91), the primary stress goes to the final heavy syllable, here it means personal ending, if it contains a long vowel such as in (a. i) and (a.iii). But in the absence of a long vowel in both root and personal ending, the final CVCC syllable gets the stress as in (a. iv), or CVC syllable in the personal ending surfaces as the heavy syllable like in (a. v). Otherwise, as it is shown in (a.ii) the long vowel in the root attracts the primary stress.

(90) The distribution of stress in present tense in IBDs

(I) a.i *daːn +aːn →dàːnaːn* 'I know''
know, Present- Personal ending 1.SG

a.ii *dʒaːj+j+it* → dʒɑ́ːjit '(s)he chews'
chew, Present- consonant hiatus- Personal ending, 3.SG

a.iii *dʒǽn+ iːn →* *dʒæniːn* 'I hit'
hit, Present- Personal ending,1.PL

a.iv *wæptǽg+ejt→wæptægéjt* 'You have slept'
sleep, Perfect- Personal ending ,2.PL

a.v *ræw+ej→ræíj* 'You go'
go, Present.2SG

(b) The primary stress pattern in simple past and past perfect as illustrated in 90(II) follows the same pattern as in present tense 90(I). In (b.i) and (b.iv), the final heavy syllable (personal ending) gets the primary stress; however, in (b.ii) the penultimate heavy syllable attracts the stress in the absence of the long vowel in the personal ending.

| | | | |
|---|---|---|---|
| (II) | b.i | *wáːrt+iːt →waːrtíːt*<br>eat, Past- Personal ending,2.PL | ‘You ate’ |
| | b.ii | *záːnt+it →záːntit*<br>know, Past- Personal ending,1.SG | ‘(s)he knew’ |
| | b.iii | *hændést+ent →hændestént*<br>laugh, Past- Personal ending, 3.PL | ‘They laughed’ |
| | b.iv | *wáːptæt+aːn →waːptætáːn*<br>sleep, Perfect- Personal ending, 1.SG | ‘I had slept’ |

In sum, based on the examples in 90 (I) and (II), the default accentual structure in IBDs is preserved in all types of verb forms.

### 3.3.3 IBDs stress pattern system in optimality theory

This section presents the optimality-theoretic analysis of the preliminary metrical representations of IBDs data developed in section 3.3.2. As discussed already, the foot type in IBDs is iamb, and in most cases the feet are binary though unary or degenerate feet are allowed as well. Further, the direction of syllable parsing is from left to right. So, the left to right binary foot will be determined by ranking the following constraints (e.g. Kager 1999, McCarthy 2008, and Kager 2007):

(91) PARSE-SYL
Syllables are parsed by feet.

(92) FT-BIN
Feet are binary under moraic or syllabic analysis.

(93) ALL-FT-LEFT
‘Every foot stands at the left edge of the PrWd (prosodic word).’

Moreover; as data shown, IBDs is an example of the quantity- sensitive language, which means the weight of the syllable affects the stress position. So, heavy syllables attract the primary stress. In OT this phenomenon is enforced by the following constraint (Kager 1999a):

(94) Weight-To- Stress Principle (WSP)
Heavy syllables must be stressed. (If heavy, then stressed.)

Thus, if the non-heavy syllable gets the primary stress, then this constraint is violated. Besides, the position of primary stress in IBDs as the data illustrate, is on the right edge of the prosodic word. It can be shown by constraint (95):

(95) ALIGN-HEAD- R
'The PrWd ends with the primary stress.'
(Kager1999)

The other important constraint which is relevant for our data analysis is PEAK PROMINENCE (Kager 207:215) which measures the syllable weight degrees. It requires the stress falls on the heaviest syllable according to the syllable parse direction.

(96) PEAK PROMINENCE (PK-PROM)
Peak (x) is more harmonic than peak (y) if |x| > |y|.

### 3.3.3.1 An OT analysis of mono-morphemic words

Focusing on the position of primary stress in disyllabic mono-morphemic words like examples in (83) leads us to the following rankings:

(97) FT-BIN, PARSE-SYL >> ALIGN-HEAD- R>> WSP, PK-PROM

As above ranking shows, FT-BIN, PARSE-SYL constraints are undominated constraints. The first constraint requires the prosodic word parsed by feet and the second enforces feet to be binary. ALIGN-HEAD- R shows that the right edge of the foot has the primary stress. WSP requires the primary stress falls on the heavy syllable and PK-PROM needs the heaviest syllable attract the stress. Tableaux (98) - (100) represent the above ranking for the selected data from (81).

The first three examples *guelː*, *koruːs* and *baːkæ*s, all contain long vowel in final or penultimate syllables. As a default accentual structure in IBDs, the long vowel attracts the primary stress since it is in the top of the IBDs syllable weight hierarchy. Now consider the following tableaux (my analysis focus only on the position of primary stress):

(98) *gueluː* [gueluː́] 'calf'

| Input: gueluː | FT-BIN | PARSE-SYL | ALIGN-HEAD- R |
|---|---|---|---|
| a.☞ (gue.luː́) | | | |
| b. (gué.luː) | | | σW |
| c. (gué).luː | *W | *W | |
| d. gue.(luː́) | *W | *W | |

In tableau (98), the optimal candidate is candidate (a) since it satisfies all constraints; *gueluː* has a sequence of two heavy syllables and as accentual default structure in IBDs, stress falls on the rightmost heavy syllable. Candidate (b) is not optimal since the penultimate heavy syllable gets the primary stress which violates the ALLGN-HEAD-R. Besides, two other loser candidates violate the higher ranked constraints namely FT-BIN and PARSE-SYL, since they have a parsed syllable and a non-unary foot.

(99) *koruːs* [koruː́s] 'rooster'

| Input: koruːs | FT-BIN | PARSE-SYL | ALIGN-HEAD- R | PK-PROM | WSP |
|---|---|---|---|---|---|
| a.☞ (ko.ruː́s) | | | | | |
| b. ( kó.ruːs) | | | σW | *W | *W |
| c. ko.(ruːś) | *W | *W | | | |
| d. (kó).ruːs | *W | *W | σW | *W | *W |

As tableau (99) demonstrates, all candidates except candidate (a) have at least two violation marks. Candidate (d) does not satisfy any of ranked constraints since it has unary foot and the light penultimate syllable gets the primary stress which is against the accentual default structure in IBDs. Candidate (b) satisfies undominated constraints, but it has three fatal violations. Finally candidate (c) violates both undominated constraints; as a result, the optimal candidate is candidate (a).

(100) *baːkæs* [bɑː́kæs] 'match'

| Input: koruːs | FT-BIN | PARSE-SYL | WSP | PK-PROM | ALIGN-HEAD- R |
|---|---|---|---|---|---|
| a.☞( bɑː́.kæs) | | | | | σ |
| b. (bɑː.kǽs) | | | *W | *W | L |
| c. (bɑː́).kæs | *W | *W | | | L |
| d. bɑː.(kǽs) | *W | *W | *W | *W | L |

As the above tableau represents, all candidates even the optimal one have a violation mark. The winner is candidate (a) which satisfies all the higher ranked constraints and its violation is not fatal. In candidate (b), the primary stress is attracted by light syllable which is against the WSP and PK-PROM. Both candidates (c) and (d) violate the higher ranked constraints namely FT-BIN and PARSE-SYL.

Now, consider the next three tableaux which evaluate the candidates as inputs of data in (82). All examples in (82) have intervocalic geminate or final CC cluster (CVCC) or CVC syllable, but no long vowels not in final nor in penultimate positions. The following three tableaux represent the optimal output for these inputs: gærdæg, kuʈʈek, and Pællink. The constraint ranking for these inputs is as tableau (98).

(101) *gærdæg* [gærdǽg] ‘core’

| Input: gærdæg | FT-BIN | PARSE-SYL | ALIGN-HEAD-R |
|---|---|---|---|
| a. ☞(gær.dǽg) | | | |
| b. (gǽr.dæg) | | | σW |
| c. ( gǽr).dæg | *W | *W | σW |
| d. gær.(dǽg) | *W | *W | |

Tableau (101) illustrates the example in which weight -by -position applies. As there are no long vowels or bimoraic syllable, then the consonants in the coda positions becomes moraic. So we have the sequence of HH syllables, since in IBDs the rightmost heavy syllable gets the primary stress so both candidates (b) and (c) are losers. Candidate (a) is winner, because it has no violations marks. Candidate (d) satisfies the lower ranked constraint ALIGN-HEAD-R, but violates all higher ranked constraints, so it is definitely a loser.

(102) *kuʈʈek* [kúʈʈek] ‘watermelon’

| Input: kuʈʈek | FT-BIN | PARSE-SYL | WSP | PK-PROM | ALIGN-HEAD-R |
|---|---|---|---|---|---|
| a.☞(kúʈ.ʈek) | | | | | σ |
| b. (kuʈ.ʈék) | | | *W | *W | L |
| c. (kúʈ).ʈek | *W | *W | | | σ |
| d. kuʈ.(ʈék) | *W | *W | *W | *W | L |

Tableau (102) demonstrates the representation of the position of primary stress in a mono-morphemic word with intervocalic geminate, as discuss in section 3.2 the geminate is underlyingly moraic in IBDs, so the first syllable is the heavy syllable and attracts the primary stress which is against ALIGN-HEAD-R constraint. While candidates (b) and (d) satisfy the ALIGN-HEAD-R, they have at least one fatal violation. Candidate(c) not only violates the lower ranked constraint ALIGN-HEAD-R, but also violates both undominated constraints. Thus candidate (a) is an optimal candidate, eventhough it has a non-fatal violation.

(103) *pællink* [pǽllìnk] ‘pigtail’

| Input: pællink | FT-BIN | PARSE-SYL | WSP | PK-PROM | ALIGN-HEAD-R |
|---|---|---|---|---|---|
| a.☞(pǽl.link) | | | * | | σ |
| b. (pæl.línk) | | | * | *W | L |
| c. (pǽl).link | *W | *W | * | | σ |
| d. pæl.(línk) | *W | *W | * | *W | L |

In Tableau (103), relevant candidates for input *pællink* are understudied. In this case, two heavy syllables namely CVG and CVCC compete to attract the primary syllable. It is expected that final heavy syllable CVCC gets the primary stress, but as CVG syllable in IBDs is heavier than CVCC, then it gets the primary stress. Candidate (a) is a winner candidate, it satisfies all higher ranked constraints and its violation is not fatal.

#### 3.3.3.2 An OT analysis of primary stress position in compounds

The accentuation of compounds in IBDs shows that the first component of compounds gets the primary stress of the entire compound. So, based on this pattern the primary stress falls on the left most of whole compound edge. Although, the bare mono-morphemic words may have final heavy syllable stressed, compounds may not. Besides, the position of primary stress in compound does not depend on the number of syllables or whether the compound is right headed or left headed. Returning to the OT analysis, the following constraints are needed:

(104) NONFINALITY$_{\text{p-Comp}}$
The final syllable of compound may not bear accent (stress)
(Alderete 1999)

(105) PROS-FAITH
The prosody features in input and output are identical.
(Alderete 1999)

(106) ALIGN-HEAD-L (PROM- Comp)
The left edge of compound gets the primary stress.

The ranking responsible for the above constraints is as in (107). NONFINALITY$_{\text{p-Comp}}$ is ranked higher, and thus the primary stress is not allowed to fall on the final heavy syllable of compound.

(107) NONFINALITY$_{p\text{-}Comp}$, ALIGN-HEAD-L (PROM- Comp) >> PROS-FAITH

Tableau (108) evaluates the optimal candidate for the input *tʃaːrʃaːnæg* ‘strong man’. As it is shown, candidate (a) is a winner form. It satisfies both undominated constraints, and has a violation which is not fatal. In candidate (b), the primary stress falls on the penultimate syllable of the compound which is against the ALIGN-HEAD-L (PROM- Comp), so it is a loser. Candidate (c) is eliminated, since the final syllable of second component gets the primary stress which violates the higher ranked constraints.

(108) *tʃaːŕ+ʃaːńæg* → [*tʃaːŕʃaːnæg*] ‘strong man’

| Input: /tʃɑːŕ+ʃɑːńæg/ | NONFINALITY$_{p\text{-}COMP}$ | ALIGN-HEAD-L(PROM- Comp) | FAITH-PROS |
|---|---|---|---|
| a. ☞ tʃɑːŕʃɑːnæg | | | * |
| b. tʃɑːrʃɑːńæg | | σW | * |
| c. tʃɑːrʃɑːnǽg | *W | σσW | * |

### 3.3.3.3 An OT analysis of primary stress position in root with an affix

As the data in (87) illustrate, the morphology governs the accent in IBDs only in the case of prohibitive and negative forms of the verb. In these two cases, the prefixes *mæ* and *næ* get the primary stress; howver they have light syllable. It seems the position of primary stress in these forms of the verb is just like compound stress as explained in 3.3.3.2. It means these two prefixes make a prosodic compound with the roots, so the leftmost syllable attracts the primary stress. Consequently, an optimal output is not faithful to the root accent and it violates following faithfulness constraint suggested by (Alderete 1999):

(109) FAITH (Accent)$_{Root}$
‘Root- controlled accent’

Two more constraints which are involved in final ranking for an input with negative or prohibitive prefix are famous faithfulness constraints which militate against the stress deletion and stress insertion namely MAX- PROM and DEP-PROM (Alderete 1999).

With these constraints in hand, the affix-controlled accent such as (87) can be defined in OT by higher ranking MAX-PROM $_{Affix}$ as in (110):

(110) MAX-PROM $_{Affix}$>> MAX-PROM $_{Root}$, FAITH (Accent) $_{Root}$

The following tableau represents the above ranking for input *mæhænd* 'Do not laugh!' As it is shown, all candidates have at least one violation. Candidate (a) is an optimal form; it has the primary stress in its affix, so it satisfies undominated constraint, but violates lower ranked constraints, which is not fatal. Candidate (b) is eliminated, since it is faithful to root accent and militate against the higher ranked constraint namely MAX-PROM $_{Affix.}$

(111) *mæ + hǽnd* →[mǽhæ̀nd] 'Do not laugh!'

| Input:/mæ+hǽnd/ | MAX-PROM $_{Affix}$ | MAX-PROM $_{Root}$ | FAITH(Accent)$_{Root}$ |
|---|---|---|---|
| a. ☞mǽhænd | | * | |
| b. mæhǽnd | *W | L | |

On the other hand, data in (88) demonstrate that the primary stress pattern in the root with other affixes preserves the default accentual structure in IBDs and word category (affix or root) does not have any role. For example in the root with an infinitive suffix like in *dɑ́ːnten* 'to know' the long vowel in the root gets the stress, whereas in *hoʃketén* 'to hear' the final heavy syllable in the suffix attracts the primary stress. The relevant constraints for OT analysis of these examples are ranked as bellow:

(112) ALIGN-HEAD- R>> WSP, PK-PROM

(113) WSP, PK-PROM >> ALIGN-HEAD-R

Ranking (112) actually deals with the input in which two heavy syllables compete to get the primary stress, but as the basic accent rule in IBDs, the rightmost heavy syllable attracts the stress such as *hòʃketén*, so ranking (112) insists on the edge of the syllable, whereas ranking (113) is (112) reranking indeed, and is relevant for an input with only one heavy syllable no matter in right edge or left edge, it then gets the primary as in dɑ́ːntèn, and thus the constraint ranking in (113) focuses on syllable weight and not syllable edge.

The following two tableaux demonstrate the above rankings for inputs hoʃketén and dɑ*́ːnten* respectively.

(114) *hoʃkét+ en* →*hoʃketén* 'to hear'

| Input:/hoʃkét+en/ | ALIGN-HEAD- R | WSP | PK-PROM |
|---|---|---|---|
| a.☞ hoʃketén | | * | * |
| b. hóʃketen | σσW | * | * |
| c. hoʃkéten | σW | **W | **W |

In tableau (114), the optimal candidate is (a), it satisfies the undominated constraint by violating two other two constraints which deal with syllable weight. Both candidate (b) and (c) are losers; they do not satisfy any undominaed nor dominated constraint.

(115) *dáːnt + en → dáːnten* ‘to know’

| Input:/ dáːnt + en/ | WSP | PK-PROM | ALIGN-HEAD-R |
|---|---|---|---|
| a.☞ dáːnten | | | σ |
| b. daːntén | *W | *W | L |
| c. dáːntén | *W | *W | σ |

As tableau (115) shows, all constraints have at least one violation. In candidate (a), primary stress falls on the heaviest syllable, however it is not in right edge. So it satisfies undominated constraints and has a non-fatal violation. Both candidates (b) and (c) do not satisfy any higher ranked constraints nor lower ranked constraint, so they are eliminated. Thus, the optimal form is candidate (a).

# Chapter (4)

### Phonological Processes in Iranian-Balochi Dialects

This chapter will disscuss the phonological processes in IBDs. These phonological phenomena are metathesis (both local and long distance consonant metathesis), local assimilation (such as voicing assimilation, nasal place assimilation and complete assimilation), hiatus resolution, final consonant devoicing, dissimilation and final coda deletion. Moreover, I will discuss another interesting topic in the phonological system of Balochi dialects; "loan phonology": how the nativization of loanwords occurs in Balochi dialects for example consonant and vowel adaptations and gemination and degemination in adapting loanwords.

This chapter is organized as follows. Section 4.1 will focus on the metathesis in IBDs; the different types of metathesis will be introduced. In section 4.2, I will explore the identity of assimilation in IBDs. Section 4.3 will focus on hiatus resolution in IBDs. Final consonant devoicing and dissimilation will be studied in section 4.4 and section 4.5 respectively. Section 4.6 discusses loanword adaption, and finally section 4.7 shows final consonant deletion in IBDs. The second part of each section deals with the relevant optimality analysis of each phonological phenomenon.

### 4.1 IBDs Metathesis

Metathesis refers to a reordering of segments (Buckley 2011). This subsection outlines the data that fall under this description and theoretical viewpoint on their analysis, namely OT.

Metathesis is a common process in Balochi (Korn2005).To organize this section, I group the data according to their metathesis type. As data (1) show, two types of metathesis are found in IBDs: group (I) are those which are known as liquid metathesis and group (II) that are sibilant metathesis (the reordered segments are underlined).

(1) IBDs metathesis

(I) IBDs liquid metathesis

| | | | | | | |
|---|---|---|---|---|---|---|
| a.i | *ʔæsru* | → | [ʔæsr] | → | [hærs][ʔærs] | 'tear' |
| a.ii | *væfræ* | → | [væfr] | → | [bærp] | 'snow' |

(II) IBDs sibilant metathesis

| | | | | |
|---|---|---|---|---|
| a.i | *tʃæsb* | → | [tʃæps] | 'glue' |

| | | | | |
|---|---|---|---|---|
| a.ii | *ʔæsb* | → | [hæps][ʔæps] | 'horse' |
| a.iii | *disk* | → | [diks] | 'disk' |
| a.iv | *mæzg* | → | [mægz] | 'brain' |

Indeed, the data in (I) describe the historical sound changes or diachronic metathesis (Hock 1985:534). In Old Persian, loss of the final vowel leads to coda clusters with rising sonority which is against the sonority sequencing principle; indeed in this case, metathesis is a strategy to repair the coda cluster with rising sonority, so the more sonorous segment, here /r/, is reordered by the less sonorous segment. In example I (a.ii) /f/ is replaced by /p/, since in the consonant inventory of IBD as table (30) in section 3 shows, there is no labiodental fricative. Besides, in [sobh]→[ sohb] 'morning', the labial stop is reversed by a glottal fricative, it can be described as in examples (1), as stops are less sonorant than fricatives then there is rising sonority in coda cluster and metathesis repairs this ill-formed cluster.

While data (II) show synchronic metathesis, indeed sibilant consonants here /s/ and /ʃ/ reverse order with an adjacent stop consonant, this phenomenon is cross-linguistically common and known as auditory metathesis:

"The temporal decoupling of the noise of a fricative from the surrounding signal, can lead to a sibilant and an adjacent stop being interpreted as occurring in the opposite of the original order." (Buckley 2011:1382)

So Balochi metathesis places the stop consonant in a more perceptible position, adjacent to the preceding vowel, while the sibilant remains perceptible without an adjacent vowel.

Indeed, both types of Balochi metathesis in (1) are examples of local metathesis. In local metathesis two adjacent segments are reordered and in our case, as illustrated in (1), we have CC metathesis.

There is one more type of local CC metathesis in Sarhaddi Balochi as in (2).

(2) *boʃqaːb* → [boχʃɑːb]

In (2) the coronal fricative is reversed by a non-coronal adjacent fricative. It can be an example of CC metathesis depending on place of articulation. A general preference for apical, here /ʃ/, to follow non-apical, here /χ/, has been observed in other languages like in Greek (Buckley 2011).

(3) represents metathesis as a transformation which is suggested by Chomsky and Halle (1968). Indeed they describe metathesis as a common phonological process and allow transformation that effect metathesis (Buckley 2011):

(3) IBDs metathesis as a transformation

| | | | | | |
|---|---|---|---|---|---|
| Structural description | | tʃ | æ | s | b |
| Structural change | 1 2 3 4 | → 1 | 2 | 4 | 3 |

In sum, there are three types of CC local metathesis in IBDs: (1) liquid metathesis which is an example of diachronic metathesis, (2) sibilant CC local metathesis, and finally (c) CC local metathesis relies on place of articulation. In next section the OT analysis of IBDs metathesis will be given.

Furthermore, there is an example of long-distance assimilation in Sarawani Balochi as in (4):

(4) Long- distance metathesis
*tænuːr* → [tæruːn] 'oven'

This type of metathesis is known as perceptual metathesis (Blevins &Garrett2004:128). Their view is that perceptual metathesis indeed reflects the perceptual difficulty of localizing the origin of a phonetic cue with long-distance effects. So data (4) is an example of long-distance liquid metathesis like in South Italian dialects of Greek (Blevins &Garrett 2004:130). Thus, postvocalic non-initial liquid *r* has been transposed into initial syllable position.

### 4.1.1 IBDs metathesis in optimality theory

In OT, the segmental correspondence constraint which presents the linear ordering of the input segments is shown in (5):

(5) LINEARITY-IO
The output reflects the precedence structure of the input, and vice versa.
(Kager1999)

This constraint is militating against metathesis, because in metathesis, sequence reordering occurs. Thus in our constraints rankings for metathesis, this constraint should be lower ranked.

Now I return to the analysis of metathesis in IBDs and constraint rankings for all three types of metathesis that are explained so far. Three examples are considered in my analysis of each type: [ʔærs], [hæps] and [boχʃɑːb]. Two more faithfulness constraints namely MAX-IO and DEP-IO are also involved in our analysis.

The first type of IBDs diachronic metathesis as in [ʔæsr]→[ʔærs] occurs as the strategy to repair the rising sonority in the coda cluster. The relevant constraint sonority sequencing principle as introduced in last section is SSP. So, ranking (6) deals with metathesis in data (1).

(6) Constraint ranking for IBDs liquid metathesis
SSP, MAX-IO, DEP-IO >> LINEARITY-IO

Above ranking shows that the optimal candidate should satisfy the sonority sequencing principle as it is higher ranked and no segment should not deleted or inserted. The following tableau represents ranking (6).

(7) *ʔæsr* [ʔærs] 'tear'

| Input: /ʔæsr/ | SSP | MAX-IO | DEP-IO | LINEARITY-IO |
|---|---|---|---|---|
| a.☞ ʔærs | | | | * |
| b. ʔæsr | *W | | | L |
| c. ʔæs | | *W | | L |
| d. ʔæser | | | *W | L |

In tableau (7), the optimal candidate is (a), it satisfies all higher ranked constraints by violating the lower ranked constraint LINEARITY-IO which is not fatal violation. Candidates (b), (c) and (d) are eliminated, since they satisfy lower ranked constraint LINEARITY by violating higher ranked constraints: rising sonority in coda cluster in candidate (b) is against the SSP, deleting the second component of the coda cluster violates the MAX-IO and inserting a vowel in coda cluster is against the DEP-IO faithfulness constraint.

The second type of IBDs metathesis is local CC metathesis in sibilants as in [tʃæsp] → [hæps]. The perception has a great role in this type of IBDs metathesis. The stop consonant is more perceptible when it is adjacent to the preceding vowel indeed. So the sequence of sonorant and stop in coda position seems to be phonotactically not well-formed in Balochi, the following constraint supports this claim:

(8) *SC] σ
The sequence of sibilant and stop is not allowed in word-final position.

The other relevant constraint for input [tʃæsb] is VOP:

(9) VOP
No voiced obstruent

VOP constraint militates against the voiced obstruent. In IBDs voiced labial is replaced by voiceless labial in coda position. In addition to MAX-IO and DEP-IO, it is especially relevant here to include the constraint IDENT-IO to prevent changes to the features targeted by the phonotactic constraint. Now consider the following ranking for the sibilant IBDs metathesis:

(10) Constraint ranking for IBDs sibilants metathesis
*SC] σ , VOP, DEP-IO , MAX-IO >> IDENT-IO>> LINEARITY

The following tableau displays above ranking for input [ʔæsb].

(11) *ʔæsb* [ʔæps] 'horse'

| Input:/ʔæsb/ | *SC]σ | VOP | DEP-IO | MAX-IO | IDENT-IO | LINEARITY_IO |
|---|---|---|---|---|---|---|
| a.☞ ʔæps | | | | | * | * |
| b. ʔæsp | *W | | | | * | L |
| c. ʔæs | | | | *W | L | L |
| d. ʔæsep | | | *W | | * | L |
| e. ʔæsb | *W | *W | | | L | L |
| f. ʔæbs | | *W | | | L | * |

As is shown in tableau (11), all candidates have at least a violation. Violations in candidate (a) are not fatal, since this candidate satisfies the higher ranked constraints, but it is not faithful to IDENT-IO. In candidate (b) and (e), there is no metathesis, so they violate the higher ranked constraint *SC] □ fatally. Candidate (c) is eliminated as well; however it has only one violation, but this is fatal. Candidates (d) and (f) are also losers.

The last type of metathesis in IBDs is CC metathesis depending on the place of articulation as in [boχʃɑːb]. The constraint encoding this type of metathesis in IBDs must penalize an apical + non-apical sequence; call it *ʃχ, as in the consonant inventory of Sarhaddi Balochi there is no /q/, but /χ/ is observed in the pronunciation of loanwords instead, so constraint *q prevents the occurrence of this consonants in the optimal output. Ranking (12) deals with this type of metathesis in IBDs and tableau (13) represent the following ranking.

(12) Constraints ranking for IBDs CC metathesis depends on place of articulation

*ʃχ, MAX-IO, DEP-IO, IDENT-IO >> LINEARITY-IO

(13) *boʃqaːb* [boχʃɑːb] ‘plate’

| Input:/boʃqɑːb/ | *ʃχ | *q | MAX-IO | DEP-IO | IDENT-IO | LINEARITY-IO |
|---|---|---|---|---|---|---|
| a.☞ boχʃɑːb | | | | | * | * |
| b. boʃχɑːb | *W | | | | * | L |
| c. boʃqɑːb | | *W | | | L | L |
| d. boqʃɑːb | | *W | | | L | * |
| e. boʃeqɑːb | | | | *W | L | L |
| f. boʃɑːb | | | *W | | L | L |

In tableau (13), candidate (a) is a winner, since it satisfies the higher ranked constraints. All other candidates have fatal violations, thus they are losers.

### 4.2 Local assimilation in IBDs

Local assimilation is defined as a phonological alternation in which two adjacent sounds become more similar. It is opposite to dissimilation, an alternation in which two similar sounds become more different. Local assimilation is contrasted with long- distance assimilation in which two non-adjacent string influence on one another (C. Zsiga 2011).

The most common types of IBDs local assimilation are exemplified below.

#### 4.2.1 Voicing assimilation in IBDs

When obstruent consonants become adjacent to other obstruent consonants or sonorants, they often come to agree in voice. Data (14) illustrate the examples in which the voiceless obstruents become voiced adjacent to voiced segment.

(14) Voicing assimilation in IBDs

| | | | |
|---|---|---|---|
| a.i | *hæftdæh* | [hæbdæh] | ‘seventeen’ |
| a.ii | zæbt | [zæpt] | ‘recorder’ |
| a.iii | *dæst nomaːz* | [dæz nomɑːz] | ‘ablution’ |
| a.iv | *sofre* | [sobræ] | ‘table cloth’ |
| a.v | *tiʃnæg* | [toʒnæ] | ‘thirsty’ |
| a.vi | *qofl* | [kobl] | ‘locker’ |
| a.vii | *fekr* | [pegr] | ‘though’ |
| a.vii | *ʔaːsmaːn* | [ʔɑːzmɑːn] | ‘sky’ |
| a.ix | *ʔosmaːn* | [ʔozmɑːn] | ‘Osman’ |
| b.i | *ɣæfæs* | [kæbæs] | ‘cage’ |
| b.ii | piʃiː | [beʒʒok] | ‘cat’ |

In all of the above examples, the assimilation is anticipatory: consonants anticipate the voicing of the right most obstruent or sonorant in the cluster. It is worth to mention that consonant /f/ is replaced by /p/ in Balochi so in (a. iv and a. vii) in fact first /f/ is replaced by /p/ and then voiceless obstruent consonant /p/ assimilates to the following voiced consonant. In (a. ii) final /t/ is deleted and sibilant fricative /s/ becomes voiced when it precedes nasal consonant. I will return to IBDs deletion in the next two sub-sections. Besides, in (b.i, b.ii) the voiceless fricative becomes voiced in intervocalic position, indeed in (b.i) at first step [f] is replaced by [p] and then becomes voiced in intervocalic position as [b].e

### 4.2.2. Nasal Place assimilation in IBDs

Nasal assimilation in place of articulation to a following consonant is very common type of assimilation of place of articulation cross-linguistically (C. Zsiga 2011). In IBDs, there are several examples which show nasal place of articulation as in (15).

(15) Nasal place assimilation in IBDs

| | | | |
|---|---|---|---|
| a.i | *mængeliːk* | [mæ̃ŋgeliːk] | 'bracelet |
| a.ii | *hænguːr* | [hæŋguːr] | 'grape' |
| a.iii | *ṭueng* | [ṭʰueŋg] | 'knee' |
| a.iv | *pællink* | [pʰællĩŋk] | 'plaints' |
| a.v | *saːlonk* | [sɑːlõŋk] | 'bride groom' |
| a.vi | *leσiːnk* | [leσĩːŋk] | 'itching' |

Examples as in (15a) already have been discussed and analyzed in section 2.2. allophonic variation in IBDs. In all examples, the coronal nasal assimilates to the place of articulation of the adjacent velar obstruent no matter whether it is voiced or voiceless.

### 4.2.3. Complete assimilation

When two adjacent sounds become identical it is known as complete assimilation. In Sarhaddi Balochi, complete assimilation is common in clusters involving /m/ as in data (16a.i-a.iii); this phonological process leads to a fake or derived geminate as discussed in the previous chapter.

(16) Assimilation of /b/ to /m/ in Sarhaddi Balochi

| | | | |
|---|---|---|---|
| a.i | *ʃæmbæt* | [ʃæmmæ] | 'Saturday' |
| a.ii | *pæmbæg* | [pæmmæ] | 'cotton' |
| a.iii | *tæmbaːku* | [tæmmok] | 'Tobacco' |
| a.iv | *næzdik* | [næzzik] | 'close, not far' |

In nearly every case discussed above, assimilation in consonant clusters tends to be anticipatory; the right most consonant dominates the whole cluster, except in (16).

#### 4.2.4 IBDs assimilation in optimality theory

In a constraint-based theory like OT, the local assimilation is represented by the markedness constraint namely AGREE which states that two adjacent segments must agree with the specific feature (Lombardi 1999). However, this markedness constraint interacts with the IDENT-IO faithfulness constraint which requires being faithful to underlying features. The list of constraints that are needed in analyzing voicing assimilation as in data (12) and complete assimilation as in data (16) is as follows:

(17) Constraints on local assimilation in IBDs

(I) Voicing assimilation

a. AGREE
Obstruent/sonorant clusters should agree in voicing

b. IDENT (Laryngeal)
Correspondent segments in input and output have identical values for [voicing].

c. IDENT- ONSET (Laryngeal)
Consonants in [pre-sonorant position] should be faithful to underlying laryngeal specification.
(Lombardi 1999)

d. MAX-C
'No consonant deletion'

(II) Complete assimilation

a. AGREE
Sonorant/ obstruent clusters should agree in nasality.

b. IDENT (Nasality)/ SO
Sonorant/ obstruent clusters should agree in nasality.

c. IDENT (Oral)
Correspondent segments in input and output have identical values for [-nasal].

d. MAX-IO
'No consonant deletion

As it is shown in (18), the agreement constraint and the positional faithfulness constraint are higher ranked so the result is that the coda will assimilate in voicing to the onset. The tableau (19) represents the evaluation for input /sobræ/.

(18) AGREE, IDENT-ONSET (Lar), MAX-C >> IDENT (Lar)

(19) *sofre* [sobræ] 'table cloth'

| Input:/sofre/ | AGREE | IDENT-ONSET(Lar) | MAX-IO | IDENT(Lar) |
|---|---|---|---|---|
| a.☞ sobræ | | | | * |
| b. sopræ | *W | *W | | L |
| c. sofre | *W | *W | | L |
| d. soræ | | | *W | L |

As tableau (19) demonstrates the optimal candidates is candidate (a) because it satisfies the higher ranked constraints since two consonants in the word-medial cluster assimilate in voicing, and it has a non-fatal violation as well. However, all other candidates satisfy the lower ranked IDENT (Lar) faithfulness constraints, but they all violate the outranked constraints such as AGREE. Thus they are losers.

The constraint ranking for complete assimilation is as (19) and tableau (20) displays the relevant ranking.

(20) Constraint ranking for IBDs the complete assimilations
AGREE, IDENT (Nasality) /V-C, MAX-C >> IDENT (*nasal)

(21) *Pæmbæ* [pæmmæ] 'cotton'

| Input:/pæmbæ/ | AGREE | IDENT(Nasality)/ SO | MAX-C | IDENT (-nasal) |
|---|---|---|---|---|
| a.☞ pæmmæ | | | | * |
| b. pæmbæ | *W | *W | | L |
| c. pæbbæ | *W | *W | | L |
| d. pæmæ | | | *W | L |

In tableau (21), candidate (a) is a winner as it satisfies all outranked constrains. Candidate (d) satisfies the higher ranked constraint, namely AGREE, but it is eliminated since it has a fatal violation. Both candidates (b) and (c) are losers as they violate all higher ranked constraints.

## 4.3 Hiatus resolution in IBDs

The sequence of adjacent vowels belonging to separate syllables (not in diphthongs) is known as vowel hiatus. In IBDs, tautosyllabic vowel sequences cannot occur. So, consonant epenthesis is employed as hiatus resolution as illustrated in the following examples (the consonant epenthesis is between hyphens).

(22) Consonant epenthesis in IBDs

(I) Phoneme /j/

a.i [distæ - j -ɑːn]
See. Present participle- consonant epenthesis- verbal ending. 1SG
'I have seen'

a.ii [ʃiwɑː - j - æ dist]
Shiwa- consonant epenthesis - Oblique See. Simple past. 3SG
'(S)he saw Shiwa.'

a.iii [ʔæjiː - j -æ gopt]
Personal pronoun, 3SG- consonant epenthesis- Oblique tell. Simple past, 3SG.
'(S)he told him/her'

a.iv [truː - j- et]
Aunt- consonant epenthesis – possessive pronoun. 2SG
'Your aunt'

a.v [se- j –om]
Three- consonant epenthesis- ordinal number marker

(II) Phoneme /ʔ/

b.i [hoʃmaze - ʔ -ent]
Delicious- consonant epenthesis- To be. 3PL
'They are delicious.'

b.ii [ges-ɑː- ʔ - on]
Home- adverb marker- consonant epenthesis- To be. 1SG
'I am home.'

b.iii [næ- ʔ -ent]
Not- consonant epenthesis- To be. 3PL
'They are not.'

b.iv [do- ʔ - om]
Two- consonant epenthesis- ordinal number marker
'Second'

As all examples in (22) demonstrate that two consonants namely /j/ and/ʔ/ can function epenthetically as hiatus interrupters in IBDs:

(i) A semivowel /j/ as in (22a). In all these examples, one of the $V_1$ or $V_2$ is a front vowel which is harmonic with semivowel /j/. This form is common pattern indeed.

(ii) A glottal stop ([ʔ]) as in data (22b), this form of consonant epenthesis is a common in Sarawani Balochi dialect.

### 4.3.1 IBDs hiatus resolution in optimality theory

Analysis of hiatus resolution patterns within OT needs a constraint that militates against the tautosyllabic adjacent vowel sequence; that constraint is labeled as 'NOHIATUS' by Casali (2011). On the other hand, there are number of constraints that will be violated by hiatus resolution. For example anti-deletion faithfulness constraint MAX-IO will be violated if one of the adjacent vowels are deleted, or if two adjacent vowels make a diphthong it is against the NODIPHTH (Casali 2011). Moreover, as the data in (22) demonstrate, only certain consonants are observed to function epenthetically as hiatus interrupters. Indeed, certain places of articulations are universally more marked than others. Lombardi (2002:2) assumes that the glottal stop has a pharyngeal specification and suggests the rightmost position for glottal stops in Smolensky's (1993) place of articulation markedness (POA) scale as in (23):

(23) *Lab, *Dor >> *Cor >> *Phar

Based on (23), the glottal stop is the optimal epenthetic consonant, since it has the lowest ranked violation in this scale. However, in IBDs as discussed semivowel dorsal [j] also has hiatus resolution function, so in this case *Phar outranked *Dor then as in (23).

Now, consider the following rankings for data (22a) as in [distæjɑːn] and (22b) as in [næʔent] respectively.

(24) Constraints ranking for semivowel epenthesis [j] in IBDs
*HIATUS, MAX-V, *DIPH >> *Phar, DEP-IO >> *Dor

(25) Constraints ranking for glottal stop epenthesis [ʔ] in IBDs
*HIATUS, MAX-V, *DIPH >> *Dor, DEP-IO >> *Phar

Tableaux (26) and (27) represent the above ranking for the input [distæjɑːn] and [næʔent]. As it is shown, in both tableaux candidates (a) are optimal, since the epenthetic consonant interrupts vowel hiatus. Candidates (b) satisfy higher ranked constraints particularly outranked NOHIATUS, but they have fatal violations namely in (26) *Phar and in (27) *Dor. Besides in both tableaux candidates (c) and (d) are eliminated as they are faithful to DEP-IO, but violate higher ranked *HIATUS which militates against the tautosyllabic adjacent vowel sequences.

(26) *distæaːn* [distæjɑːn] 'I have seen'

| Input: /distæɑːn/ | *HIATUS | MAX-V | *DIPH | *Phar | DEP-IO | *Dor |
|---|---|---|---|---|---|---|
| a. ☞ distæ.j.ɑːn | | | | | * | * |
| b. distæ.ʔ.ɑːn | | | | *W | * | L |
| c. diste.n | | *W | | | L | L |
| d. distæɑ.n | | | *W | | L | L |

(27) *næ ent* [næʔent] 'They are not'

| Input: /næent/ | *HIATUS | MAX-V | *DIPH | *Dor | DEP-IO | *Phar |
|---|---|---|---|---|---|---|
| a. ☞ næ.ʔ.ent | | | | | * | * |
| b. næ.j.ent | | | | *W | * | L |
| c. ne.nt | | *W | | | L | L |
| d. næe.nt | | | *W | | L | L |

### 4.4 Final consonant devoicing in IBDs

There is an optional devoicing of word-final stops in loanwords in Balochi (Korn 2005). That claim is supported by IBDs data as well. Furthermore, in several examples final affricates become voiceless as well. This phenomenon is more common in Sarawani and Lashari Balochi than in Sarhaddi Balochi, since Sarhaddi is more influenced by Persian. Consider the following examples:

(28) Final devoicing in IBDs

| | | | |
|---|---|---|---|
| a.i | *giːdʒ* | [giːtʃ] | 'confused' |
| a.ii | *pændʒ* | [pæntʃ] | 'five' |
| a.iii | *tæng* | [tænk] | 'tight' |
| a.iv | *siːb* | [sɪp] | 'apple' |
| a.v | *ʔaːzaːd* | [ʔɑːzɑːt] | 'free' |
| a.vi | *spiːd* | [spiət] | 'white' |
| a.vii | *speːd* | [speʈʈ] | 'speed' |
| a.ix | *tʃæsb* | [tʃæps] | 'glue' |
| a.x | *sæbæd* | [sæbæt] | 'basket' |
| a.xi | *medaːd* | [medɑːt] | 'pencil' |

### 4.4.1 IBDs final consonant devoicing in optimality theory

In OT, the markedness constraint which bans the occurrence of the voiced obstruents in syllable coda position is given in (29).

(29) *VOICED-CODA
Obstruent must not be voiced in coda position.
(Kager 1999)

Indeed constraint (29) is against the typical faithfulness constraint IDENT-IO (Voice) which requires input -output feature preserving.

The relevant constraint ranking for data (28) is given in (30). As it is shown, the markedness constraint *VOICED-CODA outranked the other faithfulness constrains.

(30) *VOICED-CODA, MAX-V >> IDENT-IO (Voice)

The following tableau represents the candidates' evaluation for input *sæbæd*.

(31) *sæbæd* [sæbæt] 'basket'

| Input:/sæbæd/ | *VOICED-CODA | MAX-V | IDENT-IO (Voice) |
|---|---|---|---|
| a.☞ sæbæt | | | * |
| b. sæbæd | *W | | L |
| d. sæbæ | | *W | L |

In tableau (31), the optimal candidate is (a). It satisfies higher ranked constraints, but both candidates (b) and (c) have fatal violations, so they are losers.

## 4.5 Dissimilation in IBDs

Dissimilation refers to a situation in which a segment becomes less similar to a nearby segment (Bye 2011). Some cases of dissimilation are also found in IBDs as shown in (32):

(32) IBDs dissimulations

| | | | |
|---|---|---|---|
| a.i | *kæftær* | [kæpdær] | 'pigeon' |
| a.ii | *væɣt* | [wæhd] | 'time' |
| a.iii | *kundʒid* | [kuntʃit] | 'sesame' |
| a.iv | *kæbrestaːn* | [kæprestɑːn] | 'cemetery' |

In all above examples, voicing dissimilation occurs as an example of feature-changing. Voiced consonants become voiceless, however the adjacent consonant is voiced as in (a.i) and (a.ii), whereas, in (aiii) and (a.iv) it is vice versa. In autosegmental phonology (Goldsmith 1976), the analysis of the voicing dissimilation can be shown as the delinking of [-voice] after another [-voice] as in (33):

(33) consonant voicing

| | | | | |
|---|---|---|---|---|
| kæ f  t ær | → | kæ p  t ær | → | kæp  d ær |
| \| \| | | \| \| | | \| \| |
| [-voice] [-voice] | | [-voice][-voice] | | [-voice][+voice] |

As illustrated in (33), two adjacent consonants are voiceless. The deletion of feature [-voice] in second segment can be explained by Obligatory Contour Principle 'OCP' (cf. Goldsmith 1976): "At the melodic level, adjacent identical elements are prohibited". The OCP was originally used in accounting for tonal phenomenon as in adjacency of high tones, but it is extended to include other features (Bye2011:1415). In the case of voicing dissimilation, indeed delinking the feature [-voice] after [-voice] is a repair strategy to avoid OCP.

### 4.5.1 IBDs dissimilation in optimality theory

In the framework of OT, the IBDs voicing dissimilation requires the OCP constraint as the higher ranked constraint and other famous faithfulness constraint as lower ranked constraints as in (34):

(34) OCP >> MAX-C, DEP-IO >> IDENT-IO (Voice)

Tableau (35) displays the evaluation for input /kæptær/. The winner candidate is (a), which satisfies all higher ranked constraints, but it is against the IDENT-IO (Voice) which is not fatal. Candidate (b) militates against the OCP constraints, so it is a loser. Both candidates (c) and (d) satisfy OCP, but they violate the other higher ranked faithfulness constraints by deleting a segment and inserting a vowel respectively, thus they are eliminated as well.

(35) *kæptær* [kæpdær] ‘Pigeon’

| Input:/kæptær/ | OCP | MAX-C | DEP-IO | IDENT-IO(Voice) |
|---|---|---|---|---|
| a.☞ kæpdær | | | | * |
| b. kæptær | *W | | | L |
| c. kæpetær | | | *W | L |
| d. kæpær | | *W | | L |

### 4.6 Loanword adaptations in IBDs

The Balochi lexicon is marked by extensive loanwords (Korn 2005). The adaptation of loans from Old, Middle and New Persian, Kurdish, Urdu, Indic and other Indo-Iranian languages as well as English, other Indo-European languages and Turkic have been only described (cf. Korn 2005), but no theoretical phonological analysis is provided on loanwords in Iranian Balochi dialects over the past years as far as the present author knows. So, in this section first the segmental adaptation of loanwords in IBDs will be investigated and then the relevant OT analysis will be given.

In general, speakers borrow words from other languages to fill the gap in their own lexical inventory. Calabrese and Leo Itzels (2009) consider two different scenarios for nativization of loanwords based on available literature on loanword phonology. (1) nativization- through-production: when word borrowing occurred by a bilingual speaker that fills a gap in the recipient (L1) language by taking the word from other language that he knows namely the donor language (L2). In that case it is assumed that the underlying representation of borrowing word is stored in the L2 long-term memory storage for lexical items and the surface representation of the borroid word follows the grammatical rules of L1. (2) nativization- through-perception: when the speaker fills a gap in his language by borrowing the word from other languages that he knows a little or not at all. It is indeed a loanword.

In the present study I will only focus on loanwords generated in nativization-through- production, since almost all IBDs speakers are bilinguals; they know Persian as a formal and educational language in Iran as well as Balochi as their mother tongue.

#### 4.6.1 Consonants adaptation

As has been already shown in IBDs consonant inventory, there is no labio-dental and velar or uvular fricative in IBDs (except in the pronunciation of educated speakers), thus in this section, I examine how the non-Balochi words with fricatives (/f, v, χ, ɣ/) are adapted into IBDs.

(I) [f] and [v] adaptation in IBDs

The data in (35) illustrate the IBDs adaptation of two phonemes [f] and [v] which are replaced by [p] and [w] respectively. In addition there are two examples in Sarhaddi Balochi in which /v/ appears as /b/ as in 36(ci, cii).

(36)

| | Non-Balochi words | IBDs adapted forms | |
|---|---|---|---|
| a.i | *felfel* | [pelpel] | 'pepper' |
| a.ii | *fa:l* | [pɑːl] | 'omen' |
| a.iii | *film* | [pilm] | 'film' |
| a.iv | *futba:l* | [putbɑːl] | 'football' |
| a.v | *telefon* | [telepon] | 'telephone' |
| a.vi | *fekr* | [pegr] | 'thought' |
| b.i | /væɣt/ | [wæht] | 'time' |
| b.ii | /væhʃi/ | [wæhʃi] | 'wild' |
| b.iii | /livɑːn/ | [liwɑːn] | 'glass' |
| c.i | /vɑsəleːn/ | [bɑːsliːn] | 'vaseline' |
| c.ii | /teləvizhən/ | [telibzon] | 'television' |

(II) [ɣ] and [χ] adaptation in IBDs

Data (37) examines the substitution of phoneme /χ/ in IBDs. Indeed there is a dialect variation in adaptation of loanwords with phoneme /χ/. In Sarawani and Lashari Balochi dialects it is mostly replaced by /h/ and in a few examples by /k/, but in the Sarhaddi Balochi dialects there are examples in which the original form of loanwords is preserved. Thus it can show that the influence of Persian on Sarhaddi Balochi is more than the other two dialects, since it is located closer to Zahedan (center of Sistan and Balochestan Province).

(37)

| | Non-Balochi words | Sarawani/Lashari adapted forms | Sarhaddi adapted forms | |
|---|---|---|---|---|
| a.i | *χu:n* | [huːn] | [huən] [huen] | 'blood' |
| a.ii | *χa:s* | [hɑːs] | [hɑːs] | 'special' |
| a.iii | *na:χon* | [nɑːhon] [pintʃ] | [nɑːhon] | 'nail' |
| a.iv | *χa:m* | [hɑːm] | [hɑːm] | 'raw' |
| a.v | *χu:g* | [huːk] | [huːk] | 'pig' |
| a.vi | *χa:k* | [hɑːk] | [hɑːk] | 'dust' |
| a.vii | *χær* | [hær] | [hær] | 'donkey' |
| a.viii | *mi:χ* | [mɪːh] | [miəh] [mieh] | 'nail' |
| b.i | *tæχt* | [tæht] | [tæχt] | 'bed' |

| | | | | |
|---|---|---|---|---|
| b.ii | *χeʃt* | [heʃt] | [χeʃt] | 'brick' |
| b.iii | *χæjjat* | [hæjɑ:t] | [χæjɑ:t] | 'tailor' |
| b.iv | *χers* | [hers] | [χers] | 'bear' |
| b.v | *χijaba:n* | [hæjɑbɑ:n] | [χæjɑbɑ:n] | 'street' |
| b.vi | *χa:mu:ʃ* | [hɑ:mu:ʃ] | [hɑ:muəʃ] [χɑ:mueʃ] | 'off' |
| c.i | *χærguʃ* | [hærgoʃk] | [kærgoʃk] [kærgoʃk] | 'rabbit' |
| c.ii | *χro:s* | [kru:s] | [kruəs] [krues] | 'cock' |

In data 37(a), all three dialects apply the same strategy to adapt the phoneme /χ/: it is replaced by /h, and indeed it is the commonest substitution. In 37(b), Sarawani and Lashari Balochi keep replacing /χ/ by /h/, but in Sarhaddi Balochi the original form of loanwords is almost preserved. For instance in (b.v) and (b.vi), only vowel adaptation occurred but not uvular substitution. Finally in data 37(c) phoneme /χ/ appears as /k/.

Data (38) illustrates that in some examples phoneme /ɣ/ is replaced /g/ and in most other cases it is pronounced as /k/. Also in two Sarhaddi Balochi examples, /ɣ/ is replaced by /χ/. Besides, as it is shown in (d.i) /ɣ/ is replaced by /h/ in Sarawani and Lashari dialects.

| (38) | Non-Balochi words | | SB/LB adapted forms | SB adapted forms | |
|---|---|---|---|---|---|
| | a.i | *kæla:ɣ* | [kælɑ:g] | [kælɑ:g] | 'crow' |
| | a.ii | *ka:ɣæz* | [kɑ:gæd] | [kɑ:gæd | 'paper' |
| | a.iii | *da:ɣ* | [dɑ:g] | [dɑ:g] | 'hot' |
| | a.iv | *ba:ɣ* | [bɑ:g] | [bɑ:g] | 'garden' |
| | a.v | *porteɣa:l* | [portægɑ:l] | [portægɑ:l] | 'orange' |
| | a.vi | *ɣola:m* | [golɑ:m] | [golɑ:m] | 'waiter' |
| | b.i | *ʔeʃɣ* | [ʔeʃk] | [ʔeʃk] | 'love' |
| | b.ii | *ʔa:ʃeɣ* | [ʔɑ:ʃek] | [ʔɑ:ʃek] | 'lover' |
| | b.iii | *ʔæɣl* | [ʔækl] | [ʔækl] | 'wisdom' |
| | b.iv | *ɣæbr* | [kæbr] | [kæbr] | 'grave' |
| | b.v | *ɣorʔa:n* | [korʔɑ:n] | [korʔɑ:n] | 'Koran' |
| | b.vi | *ɣa:ʃoɣ* | [kɑ:ʃok] | [ɣɑ:ʃok] | 'spoon' |
| | c.i | *ræɣs* | [nɑ:tʃ] | [ræχs] | 'dance' |
| | c.ii | *ʃoluɣ* | [ʃolok] | [ʃoloχ] | 'crowded' |
| | d.i | væɣt | [wæht] | [wæχ] | 'time' |

### 4.6.2 Vowel adaptation in IBDs

In addition to the cases discussed in 4.6.2, the following vowel quality changes occur in loanwords:

(I) Diphthongization

The bimoraic high front vowel /iː/ is replaced by /ie/ in Sarhaddi Balochi and /iə/ in Lashari Balochi as in following data:

(39)

| | Non-Balochi words | Sarhaddi adapted forms | Lashari adapted forms | |
|---|---|---|---|---|
| a.i | *miːz* | [miez] | [miəz] | 'table' |
| a.ii | *niːm* | [niem] | [niəm] | 'half' |
| a.iii | *diːg* | [dieg] | [diəg] | 'pot' |
| a.iv | *miːχ* | [mieh] | [miəh] | 'pin' |
| a.v | *piːtʃ* | [pietʃ] | [piətʃ] | 'twist' |
| a.vi | *kiːf* | [kiep] | [kiəp] | 'bag' |
| a.vii | *siːr* | [sier] | [siər] | 'full' |

Moreover, the bimoraic back vowel /uː/ appears as diphthong /ue/ in Sarhaddi Balochi and /uə/ in Lashari Balochi as in data (40).

(40)

| | Non –Balochi words | Sarhaddi adapted forms | Lashari adapted forms | |
|---|---|---|---|---|
| a.i | *χuːn* | [huen] | [huən] | 'blood' |
| a.ii | *puːst* | [puest] | [puəst] | 'skin' |
| a.iii | *tuːp* | [tuep] | [tuəp] | 'ball' |
| a.iv | *ʃuːr* | [ʃuer] | [ʃuər] | 'salty' |
| a.v | *ruːd* | [rued] | [ruəd] | 'river' |
| a.vi | *muːr* | [muer] | [muər] | 'ant' |

Furthermore, the long back vowel /oː/ is replaced by diphthong /ou/ in Sarawani Balochi as in following data:

(41)

| | Non-Balochi words | Sarawani adapted forms | |
|---|---|---|---|
| a.i | *hoːz* | [houz] | 'pool' |
| a.ii | *foːn* | [poːn] | 'telephone' |
| a.iii | *moːt* | [mout] | 'death' |

(II) Vowel laxness in Sarawani Balochi adapted forms

In Sarawani Balochi loan adaptations, the bimoraic high tense front vowel /iː/ and bimoraic high tense back vowel /uː/ are replaced by monomoraic lax vowel /ɪ/ and /ʊ/ respectively as in the following data:

| (42) | Non-Balochi words | | Sarawani adapted forms | |
|---|---|---|---|---|
| | a.i | *diːg* | [dɪg] | ‘pot’ |
| | a.ii | *diːr* | [dɪr] | ‘late’ |
| | a.iii | *kiːf* | [kɪp] | ‘bag’ |
| | a.iv | *biːχ* | [biːh] | ‘root’ |
| | b.i | *guːr* | [gʊr] | ‘grave’ |
| | b.ii | *ʃuːr* | [ʃʊr] | ‘salty’ |
| | b.iii | *duːɣ* | [dʊg] | ‘soft drink’ |
| | b.iv | *tuːr* | [tʊr] | ‘net’ |

(III) Final vowel lowering

In the IBDs data, word-final mid front vowel appears as front low vowel as in (43):

| (43) | Non-Balochi words | | IBDs adapted forms | |
|---|---|---|---|---|
| | a.i | *mædrese* | [mædresæ] | ‘school’ |
| | a.ii | *sofre* | [sobræ ] | ‘table cloth’ |
| | a.iii | *naːme* | [nɑːmæ] | ‘letter’ |
| | a.iv | *faːteme* | [pɑːtomæ] | ‘Fateme’ |

In sum, for dealing with an accurate analysis of segment adaptation in IBDs, diachronic investigations and explanations are needed. Since the loanwords are indeed integrated loanwords in IBDs, it means they have entered the lexicon of Balochi. Moreover, only diachronic interpretation makes it clear that how those speakers, who originally introduced the loans, applied adaptations (Calabrese 2009: 66). Whereas the present study is based on synchronic phonological knowledge of the IBDs, the more diachronic study will be left for the future researches. The OT analysis of segments adaptation in IBDs will be given in next section.

### 4.6.3 Loanwords gemination and degemination in IBDs

A in the case of word-final gemination in original Balochi words (see 3.2), there are also number of cases of gemination in loanwords (Korn 2005:271), both sonorant and obstruent consonants can be geminated in word-final position as is shown in following examples:

| (44) | Non-Balochi words | | IBDs adaptation forms | |
|---|---|---|---|---|
| | a.i | *læb* | [læbb] | ‘bride-price’ |
| | a.ii | *buːt* | [buʈʈ] | ‘boot |
| | a.iii | *kæm* | [kæmm] | ‘little’ |
| | a.iv | *mætʃ* | [mæʈʈ] | ‘match’ |

While gemination is common in Balochi, there is also number of loans degemintion in Sarhaddi and Lashari Balochi as in (45).

| (45) | Non-Balochi words | | Sarhaddi/ Lashari adaptation forms | |
|---|---|---|---|---|
| | a.i | *χæjjat* | [hæjɑːt] | ‘tailor’ |
| | a.ii | *ʔævvæl* | [ʔæwæl] | ‘first’ |
| | a.iii | *dovvom* | [doʔom] (Sarhaddi) | ‘second |
| | | | [dojom] (Lashari) | ‘second’ |
| | a.iv | *sevvom* | [seʔom] (Sarhaddi) | ‘third’ |
| | | | [sejom] (Lashari) | ‘third’ |

As the in data (45) demonstrate, the glide geminate in intervocalic position is not allowed in Sarhaddi and Lashari Balochi, whereas it is permitted in Sarawani Balochi. Example (a.i) can be an example of compensatory lengthening; the short back vowel/ɑ/ becomes long to preserve the syllable weight. However, in the other three examples there is no vowel lengthening.

### 4.6.4 IBDs loans adaptation in optimality theory

In order to establish the set of rankings for IBDs adaptation of fricatives as in data (36)-(38), the relevant constraints are listed in (46).

(46) List of markedness constraints for IBDs fricatives and coronal stops adaptation

a.i *[f]
/f/ is not allowed in Balochi adaptation forms.

a.ii *[v]
/v/ is not allowed in Balochi adaptation forms.

a.iii *[χ]
/χ/ is not allowed in Balochi adaptation forms.

a.iv [ɣ]*

/ɣ/ is not allowed in Balochi adaptation forms.

Besides all of the above constraints listed in (45), the famous faithfulness constraints MAX-C and IDENT-IO are required in our OT analysis of consonant adaptations in IBDs. The following rankings deal with IBDs adaptation of fricatives and coronal stops. The markedness constraint outranks all faithfulness constraints to block the optimal candidate without segment adaptations.

(47) Constraint rankings for consonant adaptations in IBDs

a.i [f]*, MAX-C >> IDENT- IO [f]

a.ii [v]*, MAX-C >> IDENT- IO [v]

a.iii [ɣ] *, MAX-C >> IDENT- IO [ɣ]

a.v [χ]*, MAX-C >> IDENT-IO [χ]

The following tableaux represent the rankings in (47). In all tableaux the optimal candidate is (a), since it satisfies all higher ranked constraints, while other candidates have at least one fatal violation. So tableaux (48)-(51) evaluate the optimal candidate for the following inputs:

/fekr/, /væqt/, /ɣɑːʃoɣ/, and /χær/.

(48) IBDs production of word *fekr*

| Input: /fekr/ | *[f] | MAX-C | IDENT-IO [f] |
|---|---|---|---|
| a.☞ pekr | | | * |
| b. fekr | W* | | L |
| c. ekr | | *W | * |

(49) IBDs production of word *væɣt*

| Input:/væqt/ | * [v] | *[q] | IDENT-IO (v) | IDENT-IO [q] |
|---|---|---|---|---|
| a.☞ wæht | | | * | * |
| b. væqt | *W | *W | L | L |
| c. væht | *W | | L | * |
| d. wæqt | | *W | L | * |

(50) IBDs production of word *ɣa:ʃoɣ*

| Input: /ɣɑ:ʃoɣ/ | * [ɣ] | MAX-C | IDENT-IO [ɣ] |
|---|---|---|---|
| a.☞ kɑ:ʃok | | | * |
| b. ɣɑ:ʃoɣ | *W | | L |
| c. kɑ:ʃ | | **W | * |

(51) IBDs production of word *χær*

| Input:/χær/ | *[χ] | MAX-C | IDENT-IO [χ] |
|---|---|---|---|
| a.☞ hær | | | * |
| b. χær | *W | | L |
| c. ær | | *W | * |

The second part of segment adaptation in IBDs deals with vowel adaptations, as illustrated in the data in (39) and (41), in Sarhaddi Balochi and Lashari Balochi dialects front vowel /iː/ and back vowel /uː/ appear as /ie/, /iə/ and /ue/, /uə/ respectively. Thus the number of input and output moras is preserved. The constraints needed to make an OT analysis for this phenomenon are as follows:

(52) List of constrains dealing with diphthongization in Sarhaddi Balochi and Lashari Balochi

a.i *[iː]

/iː/ is not allowed in Balochi adaptation forms

a.ii *[uː]

/uː/ is not allowed in Balochi adaptation forms.

a.iii MAX-µ -IO

Input moras have output correspondence.

Besides, faithfulness constraint IDENT-IO is required in our ranking as in (53).

(53) Constraint rankings for Sarhaddi and Lashari diphthongization

a.i [iː]*, MAX-µ-IO >> IDENT-IO [iː]

a.ii [uː]*, MAX-µ-IO >> IDENT-IO [uː]

Tableaux (54) and (55) represent the above rankings for input /diːg/ and /ʃuːr/.

(54) Sarhaddi Balochi production of word *diːg*

| Input:/ diːg/ | [iː]* | MAX-µ-IO | IDENT-IO[iː] |
|---|---|---|---|
| a.☞ dieg | | | * |
| b. diːg | *W | | L |
| c. dig | | *W | * |

Moreover, vowel laxness in Sarawani Balochi is observed in loans adaptations as in the data (42). Faithfulness constraint IDENT- IO and other relevant constraints which are listed in (55) deal with this process.

(55) List of constraints for vowel laxness in Sarawani Balochi loans adaptation

a.i *[+tense]
Tense vowels are not allowed in Sarawani Balochi adapted forms.

a.i * [iː]
/iː/ is not allowed in Sarawani Balochi adaptation forms.

a.ii * [uː]
/uː/ is not allowed in Sarawani Balochi adaptation forms.

a.iii MAX- µ-IO
Input moras have output correspondence.

The resulting rankings for constraints in (55), is illustrated in (56):

(56) Constraint rankings for vowel laxing in Sarawani Balochi

a.i * [iː], *[+tense] >> MAX-µ- IO, IDENT-IO [iː]

a.ii *[uː], *[+tense] >> MAX-µ- IO, IDENT- IO [uː]

Tableaux (57) and (58) evaluate the rankings for input /ʃiːr/ and /guːr/. The winner candidate in both tableaux is candidate (a), it satisfies the outranking constraints, but violates the lower ranked constants which are not fatal; however, two other candidates violate higher ranked constraints, so they are eliminated.

(57) Sarawani Balochi production of word *diːg*

| Input:/diːg/ | *[iː] | *[+tense] | MAX-µ-IO | IDENT-IO[iː] |
|---|---|---|---|---|
| a.☞ dɪg | | | * | * |
| b. diːg | *W | *W | L | L |
| c. dig | | *W | * | L |

(58) Sarawani Balochi production of word *guːr*

| Input:/guːr/ | *[uː] | *[+tense] | MAX-µ-IO | IDENT-IO[uː] |
|---|---|---|---|---|
| a.☞ gʊr | | | * | * |
| b. guːr | *W | *W | L | L |
| c. gur | | *W | * | L |

Final vowel lowering is the other phonological process in loans adaptations in IBDs. As data (43) demonstrates, the final mid-front vowel in an open syllable appears as closed front vowel in IBDs adaptation forms; in other words, final tense vowel in an open syllable seems to be not allowed in three Balochi dialects.

The contextual markedness constraint which militates against the occurring /e/ in word final position is *e#]w. It outranks a context–free faithfulness constraint IDENT-IO (tense).

The resulting ranking of these three constraints is:

(59) *#e]$_{w\,,}$ MAX-V >>IDENT-IO (tense)

(60) IBDs production of word *mædrese*

| Input: /mædrese/ | *e#]$_w$ | MAX- V | IDENT-IO (tense) |
|---|---|---|---|
| a. ☞ mædresæ | | | * |
| b. mædrese | *W | | L |
| c. mædres | | *W | L |

In tableau (60), candidate (a) is a winner candidate. It satisfies higher ranked constraints *e#]w and MAX-V. Candidate (b) is a loser since it militates against the higher ranked constraint. Candidate (c) satisfies *e#]w, but it has a fatal violation, so it is eliminated as well.

I will now perform an OT analysis of two phonological processes namely gemination and degemination in loanwords. The following constraints are needed:

(61) List of constraints for word-final consonant geminate in IBDs adapted forms

a.i *C#]$_w$

No short consonant in word-final position in Balochi adapted forms.

a.ii *GEM

'No geminates'

(Rose2000)

a.iii FAITHμ
No mora deletion or insertion'
(Davis 2003)

The relevant constraint ranking for input *kæm* is given in (62).

(62) $*C\#]_w$ >> FAITHμ >> *GEM

Tableau (63) represents the above ranking, and it shows the optimal candidate is (a). It satisfies the outranking constraint, but violates the lower ranked constraints which are not counted as fatal violations in this case. Candidate (b) and (c) both militate against the higher ranked constraint which is against short consonant in coda position namely $*C\#]_w$ , so they are eliminated.

(63) IBDs production of word *kæm*

| Input:/kæm/ | $*C\#]_w$ | FAITH-μ | *GEM |
|---|---|---|---|
| a. ☞ kæmm | | * | * |
| b. kæm | *W | L | L |
| d. kæːm | *W | *W | L |

The context-free markedness constraint *GEMGLIDE deals with the degemination in loanword adaptation processes in IBDs. Indeed, it outranks other relevant constraints as in (63) for input *ʔævvæl*.

(64) *GEMGLIDE, *[V] >> FAITHμ, MAX-IO, IDENT-IO [V]

Tableau (65) evaluates the optimal candidate for input *ʔævvæl*, and candidate (a) is a winner, as it degeminates the intervocalic long consonant and also the labiodental fricative consonant is replaced by the glide, so both higher ranked constraints *GEMGLIDE and *[v] are satisfied. Candidate (b), violates the anti-glide geminate constraint *GEMGLIDE, so it is eliminated. Candidate (c) and (d) preserve the labiodental fricative which militates against the higher ranked constraint *[v]; thus they are losers as well.

(65) IBDs production of the word *ʔævvæl*

| Input:/ʔævvæl/ | *GEMGLIDE | *[v] | FAITHμ | MAX- C | IDENT-IO [v] |
|---|---|---|---|---|---|
| a.☞ ʔæwæl | | | * | * | * |
| b. ʔæwwæl | *W | | L | L | ** |
| c. ʔævvæl | | **W | L | L | L |
| d. ʔævæl | | *W | * | * | L |

### 4.7 Final consonant deletion in IBDs

In IBDs, the final coronal stop that appears as the last member of word-final consonant clusters can be deleted optionally. It means that a word such as *baːleʃt* can be pronounced as [bɑːleʃ] or [bɑːleʃt]. Final [t, d] deletion is a common phonological process in American English dialects as studied by Labov et al. (1968), Guy (1980), Patrick (1991), Coetzee (2004) and others.

Coetzee (2004) considers three factors that influence the [t, d] deletion. (a) The following context. If [t, d] is followed by a consonant, it is more likely to delete than followed by a vowel or pause. (b) The preceding context. If preceding segments similar to [t, d], then [t, d] more likely to be deleted. (c) The grammatical category. [t, d] as part of the stem is more likely to be deleted than be part of the suffix. The first two factors are indeed phonological and the third one is the morphological factor indeed.

Harris (2011) considers final cluster simplification in languages in which final consonant clusters are not allowed as an example of the operation of constraints NOCOMPLEXCODA. However, this does not work in IBDs, since complex onsets and codas are allowed in Balochi (cf. section 2, present research).

Now, let us consider the following examples which illustrate the distribution of final [t] and [d] as in (66) and (67) respectively.

(66) The distribution of final [t] in IBDs

| | | | |
|---|---|---|---|
| a.i | *soht* | [soht] | '(s)he burned' |
| a.ii | *hæpt* | [hæpt] | 'seven' |
| a.iii | *næpt* | [næpt] | 'petroleum' |
| a.iv | *dʒopt* | [dʒopt] | 'pair' |
| b.i | *roʃt* | [roʃ] | 'growth' |
| b.ii | *dæst* | [dæs] | 'hand' |
| b.iii | *raːst* | [rɑːs] | 'right' |
| b.iv | *hæʃt* | [hæʃ] | 'eight' |
| b.v | *gueʃt* | [gueʃ] | 'meat' |
| b.vi | *puəst* | [puəs] | 'skin' |
| c.i | *hændest* | [hændes] | '(s)he laughed' |
| c.ii | *waːrt* | [wɑːr] | '(s)he ate' |
| c.iii | *proʃt* | [proʃ] | '(s)he broke' |
| d.i | *mætʃænt* | [mætʃæn] | 'Do not shake!' |
| d.ii | *kelent* | [kelen] | 'pike' |
| d.iii | *dʒænt* | [dʒæn] | '(s)he hits' |
| d.iv | *priənt* | [priən] | '(s)he |
| d.v | *waːrtæn t* | [wɑːrtæn] | 'They ate' |

| | | | |
|---|---|---|---|
| d.vi | *wa:ptænt* | [wɑːptæn] | 'They slept' |

(67) The distribution of final [d] in IBDs

| | | | |
|---|---|---|---|
| a.ii | *ʃord* | [ʃor] | 'watery' |
| a.ii | *zærd* | [zær] | 'yellow' |
| a.iii | *dærd* | [dær] | 'pain' |
| a.iv | *χord* | [hor] | 'small' |
| b.i | *dozd* | [doz] | 'thief' |
| b.ii | *mozd* | [moz] | 'salary' |
| b.iii | *tond* | [ton] | 'fast' |
| b.iv | *trond* | [tron] | 'fast' |
| b.v | *ʒænd* | [ʒæn] | 'tired' |
| b.vi | *send* | [sen] | 'age' |

Data (66) and (67) illustrate the distribution of [t] and [d] in the word final position. As the data 66(a) display, [t] is kept in the final position when it is preceded by a bilabial or glottal obstruent, whereas in 66(b), (c), and (d), final [t] is deleted, since it is preceded by a coronal sonorant as in 67(d) or coronal obstruent as in 66(b). Moreover, data show that final [d] deletion occurs when the preceding segment is coronal sonorant as in 67(a) or coronel obstruent as in 67(b).

So the order between different preceding contexts in terms of [t, d] deletion can be represented as the following graph:

(68)

| | | |
|---|---|---|
| | | Less deletion |
| [-cor, -son] | [h] | ↓ |
| [-cor, -son, -cont] | [p] | |
| [+cor] | [r] | |
| [+cor, -cont] | [n] | |
| [+cor, -son] | [s, z, ʃ] | |
| [+cor, -son, -cont] | [t, d] | More deletion |

What we can conclude from the above graph is that the occurrence of two segments that agree in place of articulation is more avoided than the occurrence of two sounds that agree in sonority.

Furthermore, the above examples show that final [t] deletion occurs both in root as in 66 (a, b) and suffix as in 66 (c, d), but it seems final [d] deletion only occurs in root and not suffixes.

Now, the following examples show the effect of the following context on final [t, d] deletion.

(69)

a.i *dæst-a:n* [dæssɑːn] ‘hands’
hand- plural marker
a.ii *hæʃt da:næg* [hæʒ dɑːnæg] ‘eight pieces’
eight-piece
a.iii *mæst-in-mærd* [mæssin mært] ‘drunk man’
drunk- EZAFE- man
b.i *hord-in- kæt* [hordin kæt] ‘small room’
small-EZAFE- room
b.ii *dozd- a:n* [dozzɑːn] ‘thieves’
thief- Plural marker

In 68 (a.i-a.iii), final [t] deletion occures. While in 68(a.i) and (a.iii), final [t] precedes a vowel, in 68 (a.ii) it is folloid by a consonant, thus it makes no difference whether a vowel or a consonant follows the final [t], its deletion depends only on the preceding context as it is just explained. However, it seems that final [d] deletion depends on the following context, in 68(b.i) there is no final [d] deletion, since it is followed by a vowel and not a consonant like in 68(b.ii).

### 4.7.1 IBDs final [t, d] deletion in OT

In this section, I develop the optimality theoretical analysis of final [t, d] deletion. Since this phenomenon deals with deletion, the relevant famous faithfulness constraint MAX-C is involved in our analysis, besides the markedness constraint which is violated by non-deletion, namely OCP is needed as well (Coetzee, 2004).

As it has been already explained, the preceding context has a role in final [t, d] deletion. Based on this factor, the relevant rankings are given in (70).

(70) Consonant rankings for final [t, d] deletion based on preceding context
a.i *[+cor][+cor], *[+ cor]t # >> DEP-V >> MAX-C
a.ii *[+cor][+cor], *[+cor]d# >> DEP-V >> MAX-C
a.iii MAX-C, DEP- V >> *[-son][-son], *[-son]t#

Tableaux (71), (72), and (73) represent the above rankings for input dæst, dozd and hæpt respectively.

The optimal candidate in tableaux (71) and (72) is candidate (a), as it satisfies both higher ranked markedness constraints, though it violates the faithfulness constraint MAX-C which is not fatal. Candidate (c) in the both tableaux violates the outranking constraints, so it is eliminated. Candidate (d) satisfies the higher ranked constraints, but it has a fatal violation, thus it is a loser as well.

(71) *dæst* [dæs] 'hand'

| Input:/ dæst/ | *[+cor][cor], | *[+ cor]t # | DEP-V | MAX-C |
|---|---|---|---|---|
| a.☞ dæs | | | | * |
| b. dæst | *W | *W | | L |
| c. dæset | | | *W | L |

(72) *dozd* [doz] 'thief'

| Input:/dozd/ | *[+cor][+cor] | *[+cor]d# | DEP-V | MAX-C |
|---|---|---|---|---|
| a.☞ doz | | | | * |
| b. dozd | *W | *W | | L |
| c. dozed | | | *W | L |

(73) *hæpt* [hæpt] 'seven'

| Input:/hæpt/ | MAX-C | DEP-V | *[-son][-son] | *[-son]t# |
|---|---|---|---|---|
| a.☞ hæpt | | | * | * |
| b. hæp | *W | | L | L |
| c. hæpet | L | *W | L | L |

In tableau (73), candidate (a) is a winner; as it satisfies outranking constraints. Candidates (b) and (c) are both losers, since they have a fatal violation.

# Chapter (5)

## Phonological Interface in Iranian-Balochi Dialects

The primary stress in IBDs as discussed in the chapter (3) falls on the final heavy syllable of word such as *hændaː́n* ‘I laugh’, but in the negative form of the verbs the first light syllable attracts the primary stress like in *næ̋hændaːn* (for more examples see chapter 3.3). As we can see the attachment of the prefix *næ* has the effect that the location of the main word stress shifts leftwards, to the first light syllable of the negative form of the verb. This suggests that morphological structure may play a role in determining the phonological from of the complex word. In this chapter I will concentrate in on the issue of how morphological structure plays a role in computing the phonological form of a word. It means that phonology is sensitive to the morphological structure of the word. Further, phonological properties of words may also play a role in selecting an affix with which it can combine. In other words, phonological structure of the word conditions the allomorph selection. The Sarawani Balochi prefix *p*- (the imperative marker), for instance, can only be attached to verbs that starts with a voiceless consonant as in *p-tʃaːr* ‘look!’, but not *p-gu:* ‘say!’. These kinds of interaction between phonology and morphology in IBDs like in many other languages show that there must be an interface between the phonology and the morphological structure of words.

This chapter is organized as follows. Section 5.1 will discuss the type of partial reduplication in IBDs which is known as reduplication with fixed segmentism (in IBDs, I call it “m/p reduplication”). First we look into the segmental and prosodic identity of both reduplicant and the base, and then we continue our analysis in the framework of OT. Section 5.2 will focus on the root- affix asymmetries in IBDs; both segmental and suprasegmental (syllable structure) asymmetries of root and affixes will be shown and the relevant tableaux will be given. Finally, section 5.3 will be dedicated to two phenomena, namely the imperative form of the verb and past stem in IBDs, in which the phonology has a role in selecting the affixes.

### 5.1 Reduplication with fixed-segmentism in IBDs

Augmentative reduplication with fixed segmentism requires copying of the base elements coupled with introducing a fixed segment. The added segment is an affix that is realized simultaneously with the reduplicative copy, and overwrites a portion of the reduplicant (McCarthy and Prince 1986, 1990).

Augmentative reduplication with fixed segmentism in IBDs, as in other languages with this phenomenon, and among various reduplicative patterns (cf.

Moradi, 2012), is an example of rhyming patterns. I refer to this kind of reduplication in IBDs as m/p- reduplication, which illustrates the most productive type of reduplication in these dialects as shown in following data.

(1) IBDs *m*/*p*- Reduplication

| | Base | | Reduplicative form | |
|---|---|---|---|---|
| a.i | *bætʃæk* | 'boy' | *bætʃækmætʃæk* | 'boy and so forth' |
| a.ii | *gʊk* | 'cow' | *gʊkmʊk* | 'cow and so forth' |
| a.iii | *muːd* | 'hair' | *muːdpuːd* | 'hair and so forth' |

Reduplication refers to a word formation process that can result in an identical copy of the base, or not (Urbanczyk, 2007:474). In addition to being composed of segments from the base, reduplication can also contain fixed segments. Following the work of McCarthy and Prince (1986, 1990), Alderete et al. (1999) argue that there are two distinctive types of reduplication with fixed segmentism: default segmentism and melodic overwriting. In the former a default segment is phonologically motivated and it is generally the least marked and also frequently the epenthetic segment of a language.

On the other hand, following McCarthy and Prince (1986, 1990) and Yip (1992), Alderete et al. (1999) have discussed that the overwriting string is an affixal morpheme which is relatively the marked segment that replaces segments from the base, as with the *schm*-reduplication pattern in English: *table*-<u>*schmable*</u>. Moreover, Alderete et al. (1999:357) illustrate the properties of morphological fixed segmentism based on affixation as follows:

a) Faithfulness: fixed segments may form marked structure and be in contrast with other fixed segments.
b) Alignment: fixed segments may be left-aligned, right-aligned or infixed.
c) Context-sensitivity: fixed segments may alternate by suppletion or allomorphy.

Display (2) provides more examples of the augmentative reduplication forms in IBDs, which highlights frequency, size or intensity. In IBDs, the overwriting morpheme is generally *m*-that overwriting morpheme can, however, alternate by suppletion or allomorphy just like other affixes. So, IBDs select the alternant *p*- when the word already starts with *m*- , as in the forms in 2(II):

(2) m/p-augmentative reduplication

| | | | | | |
|---|---|---|---|---|---|
| (I) | Base | | Reduplicative form | | |
| | a.i | *tʃokk* | 'child' | *tʃokkmokk* | 'child and so forth' |
| | a.ii | *kotʃæk* | 'dog' | *kotʃækmotʃæk* | 'dog and so forth; |
| | a.iii | *kæt* | 'room' | *kætmæt* | 'room and so forth' |

| | | | | | |
|---|---|---|---|---|---|
| (II) | Base | | Reduplicative form | | |
| | a.i | *moʃk* | 'mouse' | *moʃkpoʃk* | 'mouse and so forth' |
| | a.ii | *muer* | 'ant' | *muerpuer* | 'ant and so forth' |
| | a.iii | *muːd* | 'hair' | *muːdpuːd* | 'hair and so forth' |

### 5.1.1 IBDs reduplication in optimality theory

As the data in (2 I-II) show, the overwriting morpheme contains *m*- or *p*- as a prefix. Moreover, the reduplicant is a suffix. Within OT, Generalized Alignment (McCarthy and Prince 1993a, cited in Ussishkin 2007:458) provides a framework for analyzing morpheme position. So, the following two constraints impose alignment restrictions on the affixal morpheme and the reduplicant respectively:

(3) ALIGN-L (*m*/*p*-, RED)
The right edge of *m*/*p*- is aligned to the left edge of a reduplicant.

(4) ALIGN-R (RED, BASE)

The left edge of the reduplicant is aligned to the right edge of a base.

Based on our explanations given so far, it is clear that the prefix m/p- precedes the reduplicant, in other words, it affects the reduplicant and not the base. Therefore, the presence of an overwriting morpheme indicates that faithfulness to overwriting morpheme has taken precedence, through ranking, over base-reduplicant (BR) faithfulness constraint. A constraint forcing the realization of affix material is known as FAITH-AFFIX (Ussishkin 2007:467).

(5) FAITH-AFFIX
Every affixal morpheme in the input has to show up in the output.

(6) MAX-BR
Every element of Base has a correspondent in Reduplicant.
('No partial reduplication')

(7) MAX-IO
Input segment must have output correspondence.
(No deletion)

Tableau (9) shows the effect of high-ranking FAITH-AFFIX in forming the *m*-reduplicant form from the base like in *gʊkmʊk* 'cow and the like'.

(8) FAITH-AFFIX>> MAX-IO>> MAX-BR, ALIGN-L (*m*-, RED), ALIGN-R (RED, BASE)

Tableau (9) Forming *m*-reduplicant from the base

| /mm/g/gʊk-m-RED/ | FAITH-AFFIX | MAX-IO | MAX-BR | ALIGN-L (*m*,RED) | ALIGN-R (RED,BASE) |
|---|---|---|---|---|---|
| a.☞gʊk-mʊk | | | * | | |
| b. gʊk-gʊk | *W | *W | L | *W | |
| c. mʊk-gʊk | | *W | * | | *W |
| d. mʊk-mʊk | | *W | L | *W | |

The optimal candidate [gʊk-mʊk], incurs a violation of MAX-BR while it satisfies other constraints. A candidate such as *mʊk-gʊk*, which faithfully realizes the input affix *m*-, is eliminated due to its violation of MAX-IO and MAX-BR, which are against deletion and this candidate does not achieve perfect alignment of the base to the right edge as well.

In the case of *p*-reduplication in examples (2 II), p- is an alternant of the overwriting affix when the word already starts with m-.Therefore; the output like muːd-mmuːd is ungrammatical, since it violates the Obligatory Contour Principle (OCP). But, why is p- an alternate affix and not other segments like b- or even t- (since coronals are universally less marked)? To find an ansir for this kind of question and to make an analysis for p- reduplication in IBDs based on OT, I should introduce the concept of Sonority Sequencing Generalization (SSG) based on Zec (2007).

Zec (2007:187) states the Sonority Sequencing Generalization based on Selkirk (1984a:116) as follows:

(10) *‘Sonority Sequencing Generalization (SSG*)

For every pair of segments *s* and *z* in a syllable, *s* is less sonorous than *z* if
a) (i) *s* < *z*< Nucleus
or (ii) Nucleus > *z* > *s*
or b) (i) *s* < *z* and *z* is the nucleus
or (ii) *z* > *s* and *z* is the nucleus’

Moreover, some restrictions may impose on the rise or fall in sonority that go beyond the minimal requirements of SSG by constraints on sonority distance. Prince and Smolensly‘s (2004) natural hierarchy of margins is based on these constraints on sonority distance. The best margins are obstruent folloid by nasal and liquids. The hierarchy of onsets based on Prince and Smolensky (2004) is as follows (as cited in Zec, 2007:188):

(11) *ONS/L >> *ONS/N >> *ONS/O

This hierarchy illustrates that the preference for onset is the loist sonorous segments, so the least marked onsets are obstruent, and the most marked onsets are liquids.

In addition, the unmarked value for the feature [voice] in obstruent is [-voice], as stated in Voice Obstruent Prohibition (Kager, 1999: 40), which is accompanied with the other two constraints relevant to the p-reduplication pattern.

Now, it will be clear why the optimal reduplicant candidate for the input like *muːd* is *muːdpuːd*. First, as Prince and Smolensky’s (2004) hierarchy of onset yields an obstruent is the least marked segment, and [-voice] is the unmarked value in obstruents. Second, the presence of an alternation overwriting affix *p*- indicates that the labiality faithfulness constraint needs to be in our constraint ranking. In sum, the following relevant constraints should be considered for *p*-reduplication based on OT:

(12) OCP
At the melodic level, adjacent identical elements are not allowed.

(13) *ONS/N
Word-initial syllables may not begin with nasal.

(14) VOP
*[+ voice, -son]
No obstruent must be voiced.

(15) IDENT-BR (lab)
Correspondent onsets are identical in their specification for bilabiality.

The FAITH-AFFIX and MAX-BR as stated earlier are accompanied by the other four constraints introduced above; they are ranked in the following way in forming *p*-reduplicant from the base:

(16) OCP>>FAITH-AFFIX>>MAX-IO>>*ONS/N>>MAX-BR>>VOP, IDENT-BR (lab)

Tableau (17) Forming the *p-reduplicant* from the case

| /muːd-RED-m/ | OCP | FAITH-AFFIX | MAX-IO | *ONS/N | MAX-BR | VOP | IDENT-BR (lab) |
|---|---|---|---|---|---|---|---|
| ☞ a. muːd-puːd | | | * | * | * | | |
| b. muːd-muːd | | | * | **W | * | | |
| c. muːd-mmuːd | *W | | | ***W | | | |
| d. muːd-buːd | | | * | * | * | *W | |
| e. muːd-tuːd | | | * | * | * | | *W |

In this tableau, the optimal candidate from input /muːd-RED-m/ is [muːd-puːd], with the same place of articulation to affix *m-*. Although it violates *ONS/N (since the base onset is a bilabial nasal [m] ), that candidate is optimal because it avoids the violation of IDENT-BR(lab) , as shown by the comparison with suboptimal candidate [muːd-tuːd] in (17e), and also it avoids violation of VOP, as shown by the comparison with the suboptimal candidate [muːd-buːd] in (17d).

## 5.2 Root- affix asymmetries in IBDs

Roman Jakobson (1965) observes that affixes and roots show asymmetric patterning; in fact affixes and particularly inflectional affixes have selected and limited set of phonemes in comparing with roots. Moreover, Jakobson believes that more marked segments are absent in affixes (Bybee2005:166). That issue can be explained by the grammaticalization theory as proposed by Hopper & Traugott (2003). Based on this theory, the phonological segments in affixes are more reduced phonologically and they are less marked. Furthermore, Bybee (2005) believes that segments in affixes are less complex and not necessarily less marked.

Moreover, Bybee (2005: 172-173) presents four possible formulations of Jakobson’s hypotheses which concern the number of phonemes, the degree of markedness and notion of complexity and systematic absence of the set of phonemes in affixes comparing as below:

"Hypothesis 1: The number of distinct phonemes used in the inflectional verbal affixes of a language is smaller than the number that could be expected to occur by chance.

Hypothesis 2: The phonemes that occur in affixes tend to be the less marked segments of the phoneme inventory.

Hypothesis 3: The phonemes that occur in affixes tend to be the less complex segments of the phoneme inventory."

Hypothesis 4: The phonemes absent from affixes form systematic sets."

In this section the inflectional and derivation affixes in IBDs will be introduced respectively and these four discussed hypotheses will be attested against the Balochi data.

First consider the inflectional affixes in IBDs as given in table (18):

(18) List of inflectional affixes in IBDs

| Form | Label | Dialect | example | |
|---|---|---|---|---|
| *b-* | subjective marker | MB, SB, LB | *bgu* | 'tell!' |
| *p-* | subjective marker | SB, LB | *ptʃa:r* | 'look! |
| *mæ-* | prohibitive marker | MSB, SB, LB | *mæwa:r* | 'Do not eat!' |
| *næ-* | negative marker | MSB, SB, LB | *næwa:nton* | 'I do not read' |
| *-a:n* | plural marker | MSB, SB, LB | *dræhta:n* | 'trees' |
| *-ter* | comparative marker | MSB, SB, LB | *wæʃʃter* | 'better, nicer' |
| *-terin* | superlative marker | SB | *wæʃʃterin* | 'best, nicest' |
| *terien* | superlative marker | SM | *zænɖterien* | 'best' |
| *teriən* | superlative marker | LB | *selteriən* | 'worst' |
| *-a:n /on* | verbal ending 1SG (present and Past tense) | MSB, SB, LB | *ræwa:n*<br>*wa:pton* | ' I go'<br>'I slept' |
| *-ej* | verbal ending 2SG (presen and past tense) | SB | *ræij*<br>*wa:ptej* | 'you go'<br>'you slept' |
| *-i:n* | verbal ending 1PL (present and past tense) | MSB, SB, LB | *ræwi:n*<br>*wa:pti:n* | 'I go'<br>'I slept |
| *-i:t* | verbal ending 2PL (present and past tense) | MSB, SB, LB | *ræwi:t*<br>*wa:pti:t* | 'you go'<br>'you slept' |
| *-ent* | verbal ending 3PL (present and past tense) | MSB, SB, LB | *ræint*<br>*wa:ptent* | 'they go'<br>'they slept' |

As to the inflectional affixes listed above, it seems that IBDs excludes more consonants in inflectional affixes. To see whether this exclusion is random or not, consider the consonant inventory of IBDs as listed in table (19) with the consonants not used in inflectional affixes in parenthesis.

Table (19) inventory of IBDs, with consonants not used in affixes in parenthesis

| | labial | alveodental | alveolar | postalveolar | retroflex | velar | uvular | glottal |
|---|---|---|---|---|---|---|---|---|
| plosive | p b | (t) (d) | | | (ʈ) (ɖ) | (k)(g) | | (ʔ) |
| fricative | | | ( s) ( z) | ( ʃ) ( ʒ) | | (ɣ) | (χ) | (h) |
| affricate | | | | (tʃ ) ( dʒ) | | | | |
| nasal | m | | n | | | | | |
| Central approximant | (w) | | r | | ( ɻ) | ( j) | | |
| Lateral approximant | | | l | | | | | |

Based on table (19), it seems that IBDs exclude more consonants, and these exclusions appear not random, but patterned (it can be any natural class of sound). This could be defined by manner of articulation, place of articulation, voicing, or airstream mechanism (Bybee, 2002:178). Now consider the patterned exclusion in IBDs:

(a) IBDs have no fricatives and affricates in affixes.
(b) IBDs have no postalveolar, no retroflex, no velar, no uvular and no glottal consonants in affixes.

Thus only a small number of phonemes (6 out of 26) namely coronals [n, r, l] and bilabials [p, b, m] are favored in IBDs inflectional affixes. This fact supports the first, third and fourth hypotheses which have already discussed, but not the second one, as bilabials are more marked than coronals and pharyngeals.

The examination of using vowels in IBDs inflectional affixes yields that five cardinal vowels are used in affixes. All front vowels /i/, /e/, /æ/ and all back vowels /u/, /o/ except /u/ are in affixes, whereas no /ɪ/ or /ʊ/ are found in affixes. Moreover, only long /ɑ/ and /i/ are used in affixes and no other long vowels. In addition there seems to be a slight aversion for diphthongs in affixes, an only /ie/ and /iə/ are not excluded. The following table shows all phonemes which are used and not used in IBDs inflectional affixes:

Table (20) IBDs phonemes used and not used in inflectional affixes

| **Phonemes** | |
|---|---|
| **used in affixes** | **not used in affixes** |
| **Consonants** | **Consonants** |
| b[**b**gu], p[**p**tʃɑːr] t[wæʃʃ**t**er],<br>m[**m**æwɑːr] n[dræhtɑː**n**],<br>r[wæʃʃte**r**] | ʈ, ɖ, k, g, ʔ<br>s, z, ʃ, ʒ, χ, ɣ, h<br>w, j, ɻ, l<br>tʃ, dʒ |
| **Vowels** | **Vowels** |
| i[ræw**i**ːn], e [ræint]<br>æ[ n**æ**waːnton], o[wɑːpt**o**n]<br>ɑ[dræht**ɑ**ːn**]**<br>ie[zændʈer**ie**n], iə[selter**iə**n] | ɪ, ʊ, u<br>ue, uə, æu, ou |

In addition Urbanczky (2011:2492-2493) discusses the usual type of root-affix asymmetry in languages as a subset relation which is shown in (21):

(21) root affix

a. segmental inventory

| | | |
|---|---|---|
| {a} | {a} | same segmental inventory |
| {a} | {a, b} | root is a subset of affix inventory |
| {a, b} | {a} | affix is a subset of root inventory |
| {a, b} | {a, b} | same segmental inventory |

Thus, segmental contrasts found in IBDs affixes can be an instance of affixes having a subset of a root inventory. Moreover, Urbanczyk (2011) investigates not only segmental contrasts in affix-root asymmetry, but also root-affix shapes. Based on data listed in (18), affix morphemes have only a simple onset, though complex and simplex onsets are allowed in IBDs roots as discussed in section 2. Besides, the onsetless syllables like in V and VC are allowed in affixes and not in roots. Even affixes can shape as a consonant without the nucleus. Once again this is an example of an instance of affixes having a subset of the patterns found in roots. Table (22) represents the affix and root morpheme shapes in IBDs.

Table (22) IBDs morpheme shapes used in inflectional affixes and not used in inflectional affixes

| Morpheme shapes | |
|---|---|
| **used in affixes** | **not used in affixes** |
| C[**b**gu] | CCVC |
| CV[**mæ**wɑːr] | CVCC |
| VC[dræht**ɑːn**] | CCVCCC |
| CVC[wæʃʃ**ter**] | |
| CV.CVC[wæʃʃ**te.rin**] | |
| VCC[wɑːpt**ent**] | |

Derivation affixes in IBDs are given in table (23), as the data show the number of segments used in derivational affixes are more than in inflectional affixes.

(23) List of derivational affixes in IBDs

| Form | Label | Dialect | Example | |
|---|---|---|---|---|
| *hæm-* | noun marker | MSB, BS, LB | *hæmzaːt* | ‘family member’ |
| *ba-* | adjective marker | MSB, SB, LB | *bawæt* | ‘himself’ |
| *ʔer-* | compound verb marker | MSB, SB, LB | *ʔer kæpten* | ‘get off’ |
| *bɪ-* | adjective marker | SB | *bɪkaːr* | ‘unemployed’ |
| *bie-* | adjective marker | MSB | *biewæs* | ‘poor’ |
| *biə-* | adjective marker | LB | *biətaːm* | ‘tasteless’ |
| *naː-* | adjective marker | MSB, SB,LB | *naːraːh* | ‘foul’ |
| *-æg* | noun marker, adjective marker, infinitive marker | MSB, SB, LB | *tʃæmmæg*<br>*ræstæg*<br>*wæræg* | ‘fountain’<br>‘ripe’<br>‘to eat’ |
| *-æk* | noun marker | MSB, SB, LB | *sutʃæk* | ‘burning’ |
| *-ok* | diminutive marker<br>noun marker | MSB, SB, LB<br>SB | *daːrok*<br>*waːrok* | ‘small house’<br>‘eating’ |
| *-daːn* | noun marker | MSB, SB, LB | *sengdaːn* | ‘gizzard’ |
| *-naːk* | adjective marker | MSB, SB, LB | *letʃtʃnaːk* | ‘sticky |
| *-daːr* | noun marker | SB | *maːldaːr* | ‘rich’ |
| *-æka* | adverb marker | SB | *tʃæppæka* | ‘wrongly’ |
| *-aːr* | adjective marker | MSB, SB, LB | *greptaːr* | ‘busy’ |
| *-om* | noun marker | MSB, SB, LB | *ʃæʃom* | ‘sixth’ |
| *-aː* | adjective marker | MSB, SB, LB | *roʒnaː* | ‘seeing’ |
| *-iː* | indefinite marker | MSB, SB, LB | *morgiː* | ‘a bird’ |

All phonemes used and not used in IBDs derivational affixes are presented in the following table:

Table (24) IBDs phonemes used and not used in derivational affixes

| **Phonemes used in derivational affixes** | **Phonemes not used in derivational affixes** |
|---|---|
| **consonants** | **consonants** |
| b[bɪkɑːr], d[sengdɑːn], | p, t, ʈ, ɖ |
| k[letʃtʃnɑːk], | s, z, ʃ, ʒ, χ, ɣ |
| g[restæg], h[hæmzɑːt] | w, j, ɻ, l |
| m[ʃæʃom], n[nɑːrɑːh], r[greptɑːr] | tʃ, dʒ |
| **vowels** | **vowels** |
| ɪ[ bɪkɑːr], e[*biewæs*], | ʊ, u, |
| ɑ[ *roʒnaː*], | ue, uə, æu, ou |
| o[*waːrok*], æ[ *sutʃæk*], | |
| ie[*biewæs*], iə[ *biətaːm*] | |

As table (24) demonstrates, it seems that IBDs exclude the consonants in derivational affixes, as in inflectional affixes discussed already, and not randomly. In fact, IBDs have exclusions that constitute natural classes of consonants:

(a) IBDs have no fricatives except /h/, no affricates and no approximant, and only one out of five approximants in derivational affixes.

(b) IBDs have no postalveolar, no retroflex, no uvular in affixes.

The investigation of using vowels in IBDs derivational affixes proves that four cardinal vowels are used in affixes. All front vowels /i/, /e/, /æ/ and all back vowels /ɑ/, /o/ except /u/ are used in derivational affixes, whereas no /ʊ/ is found in affixes. Moreover, only long /ɑ/ and /i/ are used in affix and no other long vowels. Furthermore, among all diphthongs just /ie/ and /iə/ are preferred.

Moreover, the morpheme shapes used in derivational affixes are given in (25). As it is demonstrated in (25), only simple onset and simple codas are permitted in derivational affixes, in addition to onsetless syllables that are also permitted as in inflectional affixes.

Table (25) IBDs morpheme shapes used in derivational affixes and not used in derivational affixes.

**Morpheme shapes**

| **used in affixes** | **not used in affixes** |
|---|---|
| V[roʒn-ɑː] | CCVC |
| CV[nɑː-rɑːh] | CVCC |
| VC[ræst-æg] | CCVCC |
| CVC[seng-dɑːn] | |

In summary, based on tables (1) and (23), glides and fricatives, except one out of six are not used in inflectional nor in derivational affixes. The number of coronals and bilabials in both types of affixes is more than other places of articulation. Besides, no retroflex, postalveolar and uvular consonants are involved in affix inventories in IBDs. Additionally, morpheme shapes in IBDs affixes are simpler than in roots, and no complex onset is observed in IBDs affixes; onsetless syllables are only allowed in affixes, but not in IBDs roots.

### 5.2.1 IBD root-affix asymmetry in optimality theory

Cross-linguistically, root morphemes show a more extensive and more marked inventory of segments, and of prosodic structures, than do affixes morpheme, as in Arabic where pharyngeal consonants are limited only to roots or in Cuzco Quechua, the laryngeal stops only occur in roots and not in affixes (Beckman 1999:191).

As examples in (18) and (23) demonstrate, no retroflex or postalveolar consonants occur in IBD affixes, so the distribution of these consonants is only limited to the roots.

In OT, the following universal ranking is proposed to show that roots tend to have more marked contrasts than affixes (Urbanczyk 2011:2508).

(26) Root-affix faithfulness metaconstraint

FAITH-ROOT >> FATH-AFFIX

So as Urbanczyk (2011:2508) believes, “the location of some markedness constraint with respect to FAITH-ROOT and FAITH-AFFIX can compel alternations resulting in asymmetrical patterns.” For example, the following constraint ranking accounts for the IBDs, where roots have retroflex consonants, but affixes do not.

(27) FAITH-ROOT >> *RETROFLEX>> FAITH-AFFIX

The following tableau represents above ranking for the input *ʈuːh-ter* 'bigger'. The optimal candidate is (a), though it has a violation which is not fatal comparing to other candidates. Candidate (b) violates the anti-retroflex constraint twice and FAITH-AFFIX. Thus it is the loser. Both candidates (c) and (d) are eliminated as well, since they violate the higher ranked constraint FAITH-ROOT.

(28) *ʈuːh-ter* [ʈuːh-ter] big- comparative marker 'bigger'

| Input:/ ʈuːh-ter/ | FAITH-ROOT | *RETROFLEX | FAITH-AFFIX |
|---|---|---|---|
| a. ☞ ʈuːh-ter | | * | |
| b. ʈuːh-ʈer | | **W | *W |
| c. tuːh-ter | *W | | |
| d. tuːh- ʈer | *W | * | *W |

## 5.3 Phonologically conditioned allomorph selection in IBDs

Cross-linguistically, there are a number of examples of allomorph choice which depend on the phonological rules. Nevins (2011) introduces six phonological conditions forcing allomorph choice in terms of segmental- level phenomena, syllable-level phenomena, and prosodic-level phenomena as follows:

(1) segmental dissimilation, (2) segmental phonotactics, (3) syllable structure, (4) morphological alignment, (5) stressedness and vowel quality and (6) foot structure.

In this section, two examples of IBDs allomorph choice namely imperative marker and past stem marker which can be predicted on the basis of phonological conditions on the phonological configuration will be investigated. Furthermore, the six phonological conditions proposed by Nevins (2011) will be considered in Balochi data analyses.

### 5.3.1 Imperative from in IBDs

In Sarhaddi and Lashari Balochi, the imperative form of the verbs is expressed by adding prefix, *b-* as in (29a), or *be-* such as (29b) which has already the bilabial segment in the word initial position of the present stem, and finally a zero allomorph is chosen, *ø-*, as (29c), which has already /b/ in the onset position of present stem. In compound verbs, the verbal element gets a zero allomorph, ø-, as shown in (29d).

(29) Imperative forms in Sarhaddi and Lashari Balochi

| | | |
|---|---|---|
| a.i | *b-zaːn* | |
| | imperative marker- present stem | 'Know!' |
| a.ii | *b-dʒæn* | |
| | imperative marker- present stem | 'Hit!' |
| a.iii | *b-hænd* | |
| | imperative marker- present stem | 'Laugh!' |
| a.iv | *b-trakin* | |
| | imperative marker- present stem | 'Explore ' |
| b.i | *be-wæps* | |
| | imperative marker- present stem | 'Sleep!' |
| b.ii | *be-miːr* | |
| | imperative marker- present stem | 'Die!' |
| b.iii | *be-pætʃ* | |
| | imperative marker- present stem | 'Cook!' |
| c.i | *ø-bondej* | |
| | imperative marker- present stem | 'Make fire!' |
| d.i | *pætʃ ø-kæn* | |
| | open- imperative marker | 'Open!' |
| d.ii | *gæːʈ ø-kæn* | |
| | bite-imperative marker | 'Bite!' |

However, in Sarawani Balochi the imperative form of the verb can be indicated by four separate allomorphs: b-, the most unmarked allomorph as in Sarhaddi and Lashari Balochi, it is used for verbs such as (30a), that have a voiced consonant in the word-initial position of the present stem. The second-choice allomorphs, [bu] or [be], are found with verbs such as (30bi) and (30bii) respectively, in both examples, the voiced bilabial consonant is in an onset position of the present stem. The third-choice allomorph, [p-], occurs in verbs as (30c), which have a voiceless consonant in the word-initial position. The fourth-choice allomorph, [m-] is used for verbs such as (30d), which have a nasal segment in an onset position. Besides, the imperative form of compound verbs is formed by adding allomorph [b] to the verbal element of the present stem with voiced segment in an onset position as (30e), and an allomorph [p] with a verbal element, and with a voiceless consonant in a word-initial position.

(30) Imperative forms in Sarawani Balochi

| | | | |
|---|---|---|---|
| a.i | *b-guː* | | |
| | imperative marker- present stem | | 'Tell!' |
| a.ii | *b-lekk* | | |
| | imperative marker- present stem | | 'Write!' |
| a.iii | *b-dʒæŋg* | | |
| | imperative marker- present stem | | 'Fight!' |
| b.i | *bu-waːn* | | |
| | imperative marker- present stem | ' | Read!' |
| b.ii | *be-bær* | | |
| | imperative marker- present stem | | 'Take!' |
| c.i | *p-suːtʃ* | | |
| | imperative marker- present stem | | 'Burn!' |
| c.ii | *p-tʃaːr* | | |
| | imperative marker- present stem | | 'Look!' |
| c.iii | *p-koʈʈ* | | |
| | imperative marker- present stem | | 'Knock!' |
| d.i | *m-nened* | | |
| | imperative marker- present stem | | 'Sit down!' |
| e.i | *naːtʃ p-kæn* | | |
| | dance- imperative marker- to do | | 'Dance!' |
| e.ii | *dour b-de* | | |
| | turn- imperative marker- give | | 'Turn!' |

Based on data (29) and (30), the force to allomorph selection in imperative from in IBDs can be derived from the segmental phonotactics. It means the allomorph selection indeed leads to avoidance of particular allomorphs when they would incur violations of combinatorial phonotactics (Nevins 2011:2361). So in all of the above examples, [b-] is the default imperative marker, and [be-] is chosen when it precedes a bilabial voiced segment, in order to avoid adjacent of co-articulated segments in an onset position. Whereas in 30(c) and (e.i), [p-] is used, since it precedes a voiceless segment, and indeed it is an example of assimilation: a voiced bilabial stop that immediately precedes a voiceless consonant can be replaced by the corresponding voiceless stop, and [m-], is found when it precedes the nasal segment which is an instance of nasal assimilation as discussed in the previous sections of the present study as 30(d).

### 5.3.1 IBDs imperative allomorph selection in OT

In the section that follows, the existence of phonological condition in IBDs will be investigated based on OT as a constrained-based model.

Let us begin by considering cases such as 29(b) and 30(b). In those examples the allomorph [be-] and [bu-] are used with the present stem and have a bilabial voiced segment in their word-initial position, so the epenthesis vowel [e] or [u]; avoids, the occurrence of adjacent identical element in an onset cluster. Indeed, this allomorph selection satisfies the 'Obligatory Counter Principle' (OCP) constraint, which should be higher ranked than other faithfulness constraints; furthermore the quality of epenthesis vowel depends on the following vowel in the stem as shown in (30). The constraint rankings deal with imperative from of verbs as *waːnten* 'to read' or *morten*' 'to die' are given respectively in (31):

(31)

I. OCP, *[- back] >> MAX-C >> DEP- IO

II. OCP, *[+ back] >> MAX-C >> DEP-IO

The following tableaux represent the above rankings.

(32) *b-waːn* [bu-wɑːn] 'Read!'

| Input: /b-wɑːn/ | OCP | *[- back] | MAX-C | DEP-IO |
|---|---|---|---|---|
| a.☞ bu-wɑːn | | | | * |
| b. be-wɑːn | | *W | | * |
| c. b-ɑːn | | | *W | L |
| d. b-wɑːn | *W | | | L |

(33) b-miːr [be-miːr]'Die!'

| Input: /b-miːr/ | OCP | *[+back] | MAX-C | DEP-IO |
|---|---|---|---|---|
| a.☞ be-miːr | | | | * |
| b. bu-miːr | | *W | | * |
| c. b-iːr | | | *W | L |
| d. b-miːr | *W | | | L |

As tableaux (32) and (33) illustrate, the optimal candidate in both tableaux is candidate (a), since it satisfies the higher ranked constraints and has a non-fatal violation. Both candidates (b) and (c) satisfy the OCP constraint, but they have a fatal violation which leads them to be a loser. Candidate (d) is eliminated as it incurs the fatal violation.

The choice of allomorph [p-] in Sarawani Balochi as data 30(c) and (e.i) show can be analyzed as local assimilation. In fact the imperative marker agrees in voicing with the following consonant to satisfy the AGREE constraint; two more constraints namely FAITH-AFFIX and FAITH-ROOT are needed in the analysis as ranked in (34).

(34) AGREE (voicing), FAITH-ROOT>> MAX-C >> IDENT-IO>> FAITH-AFFIX

As ranking (34) indicates, the AGREE and FAITH-ROOT are ranked higher than two famous faithfulness constraints DEP- IO and IDENT-IO and FAITH-AFFIX is lower ranked.

Tableau (35) demonstrates the ranking in (34). As it is shown the winner candidate is candidate (a), the imperative marker agrees in voicing with the word-initial consonant of a present stem, so it satisfies both higher ranked constraints; however, it violates lower ranked constraints non-fatally. Candidate (b) is eliminated, it violates the higher ranked constraint AGREE. Both constraints (c) and (d) are losers, since they have at least one fatal violation.

(35) *b-tʃa:r* [p-tʃɑːr] 'Look!'

| Input:/b-tʃɑːr/ | AGREE | FAITH-ROOT | MAX-C | IDENT-IO(voice) | FAITH-AFFIX |
|---|---|---|---|---|---|
| a.☞ p-tʃɑːr | | | | * | * |
| b. b-tʃɑːr | *W | | | | L |
| c. b-dʒɑːr | | *W | | * | L |
| d. tʃɑːr | | | *W | L | * |

Data 30(d) is an example of nasal assimilation. In this case, segments agree in nasality. So again like in ranking (34), the constraint which deals with assimilation namely AGREE outrankes other relevant constraint as in ranking (36):

(36) AGREE (nasality), FAITH-ROOT>> MAX-C >> IDENT-IO>> FAITH-AFFIX

The above ranking is represented in tableau (37) which evaluates the optimal candidate for input /b-nend/. As it is illustrated the optimal output is candidate (a), in which the imperative marker assimilates to the following nasal segments and it is replaced by a bilabial nasal. Candidate (b) satisfies all the constraints by being faithful to FAITH-ROOT and FAITH-AFFIX constraints; however, it has a fatal violation which leads it to be eliminated. Candidate (c) is a loser as well, since it has two violations. Both candidates (d) and (e) are not optimal as no nasality agreement occurs in them, and candidate (e) agrees in orality and not nasality.

(37) *b-nened* [m-nend] 'Sit down!'

| Input:/b-nend/ | AGREE | FAITH-ROOT | MAX-C | IDENT-IO(nasality) | FAITH-AFFIX |
|---|---|---|---|---|---|
| a.☞ m-nend | | | | * | * |
| b. b-nend | *W | | | L | L |
| c. nend | | | *W | L | * |
| d. b-end | | *W | *W | L | L |
| e. b- tend | | *W | | * | L |

### 5.3.2 Past stem in IBDs

The choice of phonologically related allomorphs in IBDs can also be found in the pattern of allomorphy with the IBDs past stem suffix, in which there are two past stem markers as shown in 36(b). These two allomorphs are [-t], [-it].

(38) Past stem suffix allomorphy in IBDs

| | Present stem | Past stem | |
|---|---|---|---|
| a.i | *kuʃ* | *kuʃ-t* | ' die' |
| a.ii | *gwar* | *gwar-t* | 'rain' |
| a.iii | *zaːn* | *zaː*n-*t* | ' know' |
| a.iv | *waːr* | *waː*r-*t* | 'eat' |
| a.v | *kæp* | *kæp-t* | 'fall' |
| b.i | *lekk* | *lekk-it* | 'write' |
| b.ii | *loʈʈ* | *loʈʈ-it* | 'want' |
| b.iii | *hænd* | *hænd-it* | 'laugh' |
| b.iv | *dozz* | *dozz-it* | 'steal' |
| b.v | *dærr* | *dærr-it* | 'tear' |
| b.vi | *purs* | *purs-it* | 'ask' |
| b.vii | *kæʃʃ* | *kæʃʃ-it* | 'strengthen' |

As 38(a) shows, in IBDs the past stem suffix [-t] is used when the roots have CVC structure otherwise, the allomorph [-it] is chosen with the roots that have CVCC structure as in 38(b).

The IBDs past stem suffix allomorphy can be an instance of phonologically conditioned allomorphy in the domain of syllable structure (Nevins, 2011:2362): "When there are two or more allomorphs, the choice among them often is based on yielding the syllable structure that avoids codas, avoids hiatus, or avoids complex codas without a sufficient sonority drop.”

The IBDs past stem -t/-it is a case of three consonantal coda cluster avoidance, in which choosing it in coda cluster contexts allows one to avoid a sequence of three consonants in word-final cluster (CVCCC), which is not allowed in IBDs syllable structure.

Moreover, there are number of past stems in IBDs that do not follow the regular and synchronic pattern as described already. In (39) we can find some examples:

(39) Past stem in IBDs (exceptional forms)

| Present stem | | Past stem | |
|---|---|---|---|
| a.i | *duːtʃ* | *duːht* | ‘sew’ |
| a.ii | *ruːp* | *ruːpt* | ‘siep’ |
| a.iii | *pætʃ* | *pætk* | ‘cook’ |
| a.iv | *dʒæn* | *dʒæt* | ‘hit’ |
| a.v | *gind* | *dist* | ‘see’ |
| a.vi | *ʃuːd* | *ʃost* | ‘wash’ |
| a.vii | *bænd* | *bæst* | ‘wrap, close’ |
| a.viii | *bær* | *bort* | ‘take’ |
| a.ix | *nend* | *nest* | ‘sit’ |
| a.x | *ræw* | *ʃot* | ‘go’ |
| a.xi | *waːps* | *waːpt* | ‘sleep’ |

#### 5.3.2.1 IBDs past stem allomorphy suffix in OT

As (38a) illustrates, [-t] is the allomorph ordinarily chosen with CVC root template, while *–it* is chosen with CVCC root template. To investigate data 38(a) based on OT, both FAITH-ROOT and FAITH-AFFIX constraints are undominated and the faithfulness constraint DEP-IO and markedness constraint *COMPLEX $^{COD}$ are lower ranked as given in (40):

(40) FAITH-AFFIX, FAITH-ROOT>> DEP-IO >> *COMPLEX$^{COD}$

The following tableau evaluates the optimal candidate for input *koʃ-t* “die”. The optimal candidate is (a). It satisfies undominated constraints and it has non-fatal violation. Candidate (b) is a loser, since it has two fatal violations.

(41) *koʃ-t* [koʃ-t] 'die'

| Input: /koʃ-t/ | FAITH-ROOT | FAITH-AFFIX | DEP-IO | *COMPLEX^COD |
|---|---|---|---|---|
| 1.☞ koʃ-t | | | | * |
| 2. koʃ-it | | *W | *W | L |

Ranking (42) deals with the data 38(b), in which the allomorph [-it] is used to avoid the sequences of three consonants in the coda position, so the constraint *CCC#] $_{\sigma}$ outranked the faithfulness constraints which are relevant in our analysis.

(42) *CCC#] $_{\sigma}$, FAITH-ROOT >> MAX-C >> DEO-IO, FAITH-AFFIX

As illustrated in tableau (43), the optimal candidate for input *lekk-t* is candidate (a), since it satisfies the undominated constraints namely *CCC#] $_{\sigma}$, and FAITH-ROOT. Candidate (b) and (c) are both eliminated as they violate the higher ranked constraints.

(43) *lekk-t* [lekk-it] 'write'

| Input:/lekk-t/ | *CCC#] $_{\sigma}$ | FAITH-ROOT | MAX-C | DEP-IO | FAITH-AFFIX |
|---|---|---|---|---|---|
| a.☞ lekk-it | | | | * | * |
| b. lekk-t | *W | | | L | L |
| c. lek-t | | *W | *W | L | L |

# Chapter (6)

## Concluding Remarks

In this work, the phonological system of three selected Iranian-Balochi dialects (IBDs) namely Mirjaveh Sarhaddi Balochi (MSB), Sarawani Balochi (SB) and Lashari Balochi (LB) have been studied. These three dialects are spoken in the province of Sistan and Baluchestan located in the southeast of Iran.This investigation has considered both descriptive and theoretical approaches, so this study has given precise description and analysis of the phonological system of Iranian-Balochi dialects. The descriptive part has been done in accordance with the principles of descriptive linguistics, and in the theoretical part, the language data has been analyzed in the frame work of OT. As discussed in the introduction of this thesis, the language is not treated from a historical-comparative point of view, nor does it treat sociolinguistic issues of the IBDs community, although the sociolinguistic situation of IBDs is an interesting topic for further investigations, particularly study the language contact and loanwords based on gender, education and, age etc.

This study supports, to a large extent, previous studies on the different Balochi dialects, including Eastern, Western and Southern dialects (see chapter 1). However, there are some important phonological topics which have not been investigated before and the present study has focused on them. These complementary topics are as follows:

- The consonant and vowel inventories suggested in the chapter which deals with the segmental phonology of IBDs are not dissimilar to those presented in the earlier studies, especially studies on the Iranian Balochi dialects done by scholars such as Jahani and Korn (2009) and Korn (2006). However; in the vowel system of SB in the present study, there are two vowels (/ɪ/, /ʊ/) which are not mentioned in the previous studies on Sarawani Balochi dialect such as in Baranzehi (2003) and Okati (2012). Moreover, the distribution of allophonic variations like aspiration stops and affricates, and dorsal nasal have been investigated in the present research and only investigation on vowel nasalization has been done in the previous works like in Baranzehi (2003), Korn (2005), and Okati (2012). In addition, the present study has given special attention to study the distribution of retroflex consonants in Balochi, since the occurrence of these sounds is not frequent cross- linguistically.

- In the Balochi literature, the syllable structure and stress pattern system in Balochihave been described very briefly, with no precise description or analysis (for example Korn 2005, Jahani& Korn 2009), but the present work has given a clear and extensive description and analysis of all suprasegmental aspects of Iranian-Balochi dialects. Furthermore, investigating two types of gemination namely word-final gemination and intervocalic gemination has only been done in this work, while other scholars such as Jahani and Korn (2005) just give brief explanation with some examples, but no discussion on the internal structure of geminate in Balochi has been found in the previous literature.

- Phonological processes in Balochi have been studied by scholars as Korn and Jahani (2009), Korn (2005), but precise and detailed discussion of phonological processes in Iranian Balochi dialects such as local and long distance assimilation, dissimilation, hiatus resolution, final consonant devoicing and final consonant deletion has been restricted to the present work. Discussing the loanword adaptation in IBDs supports the previous work done by Balochi scholars (Korn 2005, Jahani and Korn 2009, for example). Moreover, diphthongization and degemnation are two processes in the loan phonology of IBDs that are introduced in the present study.

- One of the most important contributions of this current study in the research on the phonological system of Balochi is the analysis of the phonological interface between Iranian-Balochi dialects.Study reduplication with fixed segmentism("/m-p/ reduplication") is restricted to the present investigation. Furthermore, finding root-affix asymmetries in Balochi has not been investigated before.

- A further important feature of the present study which may make it unique is the combination of description and analysis in each section. Thus first each phonological topic has been described comprehensivly and then the relevant optimality theoretical analysis has followed each description.

Based on what has been discussed hereto, the author's opinion that almost all relevant topics on the phonological system of Balochi which have not been studied before, have been investigated comprehensively in the present work, and as such this research has provided a great contribution to the Balochi linguistics literature. The last part of the current chapter is dedicated to finding the microvariation in the phonological system of these three dialects.

Regarding OT as a theory of language variation, (since the very strong hypothesis in classical OT defends the idea that the systematic differences between two languages can only be the result of different rankings of the same constraints (van Oostendorp 2008), I will focus in the present section as the last part of this research on the microvariation among the phonological system of the selected Iranian Balochi dialects. Van Oostendorp (2008) explains that microvariations between language systems which are genetically and typologically close can be represented within OT. Different types of variations are distinguished in van Oostendorp (2008) as follows:

- Intraspeaker variation, i.e. variation within a speaker. This type of variation can be subdivided into :
    - Pragmatic variation, i.e. meaningful variation like formal v. informal speech; fast vs. slow speech; etc.
    - Free variation, i.e. not meaningful variation. Two forms that count as equally optimal internally, and which do not depend on the external factors.
- Interspeaker variations, i.e. two speakers speak differently.
    - Geographical variation, i.e. variation between ‘dialects’ of the same ‘language’
    - Sociolinguistic variation, i.e. variation between men vs. women; young vs. old people; etc.
    - Temporal variation, i.e. language change; people speak differently from their ancestors.

In the present study, I will only investigate the geographical variations in the phonological system of Balochi dialects that have been already studied in the previous five chapters. Working on other variations like sociolinguistics and temporal could be two very interesting topics for further studies.

Van Oostendorp (2008:20) considers three reasons to study geographical variation:

"Individual dialects are interesting in their own right; comparison of closely related systems can shed more light on how one system is organized; and the existence of geographical variation itself poses certain questions."

.In the phonological system of Balochi dialects, we can find the most microvariation in the domain of loanword adaptation more specifically segmental (consonant and vowel) adaptation. As it has been discussed already in chapter four, different Balochi dialects have their own strategies of adapting loanwords. Data 1-3 show the microvariations in Balochi dialects in adapting loanwords:

| | | | | | |
|---|---|---|---|---|---|
| 1) | Non-Balochi words | | | SB/LB/MB adapted forms | |
| | a.i | *tæχt* | [tæht] | [tæχt] | 'bed' |
| | a.ii | *χeʃt* | [heʃt] | [χeʃt] | 'brick' |
| | a.iii | *χæjjat* | [hæjɑːt] | [χæjɑːt] | 'tailor' |

| | | | | | |
|---|---|---|---|---|---|
| 2) | Non-Balochi words | | | Sarhaddi adapted forms | |
| | a.i | *miːz* | [miez] | [miəz] | 'table' |
| | a.ii | *niːm* | [niem] | [niəm] | 'half' |
| | a.iii | *diːg* | [dieg] | [diəg] | 'pot' |
| | b.i | *tuːp* | [tuep] | [tuəp] | 'ball' |
| | b.ii | *ʃuːr* | [ʃuer] | [ʃuər] | 'salty' |
| | b.iii | *ruːd* | [rued] | [ruəd] | 'river' |

| | | | | |
|---|---|---|---|---|
| 3) | Non-Balochi words | | Sarawani adapted forms | |
| | a.i | *diːg* | [dɪg] | 'pot' |
| | a.ii | *diːr* | [dɪr] | 'late' |
| | a.iii | *kiːf* | [kɪp] | bag' |
| | b.i | *guːr* | [gʊr] | 'grave' |
| | b.ii | *ʃuːr* | [ʃʊr] | 'salty' |
| | b.iii | *duːɣ* | [dʊg] | 'soft drink' |

The above examples illustrate the variation among IBDs: different Blochi dialects have their own way of adapting loanwords. As example(1) shows Sarawani and Lashari Balochi adapt fricative consonant, namely /χ/ as /h/, while Sarhaddi Balochi speakers mostly pronounce borrowing words with /χ/ as original form.Therefore preserving the original forms of borrowing words in Mirjaveh Sarhaddi Balochi can be seen as the case of a language contact. Sistan and Baluchestan province like other provinces in Iran has Persian as an official language. Balochi, Barahui, Kurdishare also spoken indifferent areas of the province with no official role. Persian has a number of dialects itself, among which is Sistani. Sistani is spoken mostly in the Sistan region in Sistan and

Baluchestan.Geographically speaking, Mirjaveh Sarhaddi is spoken in the area (Mirjaveh) which is located closer to the center of province, which has more Persian speakers. So MSB is highly influenced by Persian.

Moreover, as (2) shows, diphthongization plays an important role in MSB and LB, while in Sarawani Balochi (3bi-biii) vowel laxness is observed.

In the following section, I will attempt to represent the variation presented in the previous examples based on Optimality Theoretic constraints. First consonant adaptation and then vowel adaptation in IBDs will be represented within the framework of OT.

Consideration of consonant adaptation in IBDs based on examples (1) leads us to the constraint rankings (4). As shown in (4a), markedness constraint *[χ] is higher ranked than the faithfulness constraint IDENT-IO [χ], while in (4b) faithfulness constraint (IDENT-IO [χ]) outrankes markedness constraint [χ]. So the optimal candidate for (4a) as it is presented in tableau (5) is not allowed to have [χ] and the winner for second ranking (4b) should be faithful to the input as shown in tableau (6). As a result, reranking the constraints gives us two different outputs for Balochi dialects.

(4) Constraint rankings for uvular fricative /χ/ adaptations in Lashari/Sarawani and Sarhaddi Balochi respectively:

a. *[χ], MAX-C >> IDENT-IO [χ]

b. IDENT- IO [χ] >>>* [χ], MAX-C

(5) Lashari/ SarawaniBalochi production of word *χær*

| Input:/χær/ | *[χ] | MAX-C | IDENT-IO [χ] |
|---|---|---|---|
| a.☞ hær | | | * |
| b. χær | *W | | L |
| c. ær | | *W | * |

(6) SarhddiBalochi production of word *χær*

| Input:/χær/ | *[χ] | MAX-C | IDENT-IO [χ] |
|---|---|---|---|
| a.☞ hær | | | * |
| b. χær | *W | | L |
| c. ær | | *W | * |

To represent the vowel adaptation in IBDs (data 2-3), following constrains rankings are required.

(7) Constraint rankings for /iː/and /uː/ in Sarhaddi, Lashari and Sarawani Balochi dialects.

a.i *Diphthong, *[iː] >> IDENT-IO [iː], MAX-µ-IO
a.ii *[iː], MAX-µ-IO >> *Diphthong, IDENT-IO [iː]
a.iii *Diphthong, *[uː] >> IDENT-IO [uː], MAX-µ-IO
a.iv *[uː], MAX-µ-IO >> *Diphthong, IDENT-IO [uː]

As shown in the above rankings, (7a.i-a.iii) deals with the optimal candidates for SarawaniBalochi, since in that dialect we do not observe diphthongization. Rankings (7a.ii-aiv) are relevant for the vowel adaptations in Sarhaddi and Lashari Balochi. Interestingly, by reranking the same constraints, we have optimal outputs in each dialect.

Following tableaux (8-10) represent the above rankings respectively. In all tableaux, the winner candidate is candidate (a), which does not violate any of higher ranked constraints, while other candidates have a fatal violation.

(8) Sawani Balochi production of word *diːg*

| Input:/diːg/ | *Diphthong | *[iː] | IDENT-IO [iː], | MAX-µ-IO |
|---|---|---|---|---|
| a.☞ dɪg | | | * | * |
| b. diːg | | *W | L | L |
| c. dieg | *W | | * | L |

(9) Sarhaddi Balochi production of word *diːg*

| Input:/ diːg/ | *[iː] | MAX-µ-IO | *Diphthong | IDENT-IO[iː] |
|---|---|---|---|---|
| a.☞ dieg | | | * | * |
| b. diːg | *W | | L | L |
| c. dig | | *W | L | * |

(10) Lashari Balochi production of word *diːg*

| Input:/ diːg/ | *[iː] | MAX-µ-IO | *Diphthong | IDENT-IO[iː] |
|---|---|---|---|---|
| a.☞ diəg | | | * | * |
| b. diːg | *W | | L | L |
| c. dig | | *W | L | * |

(9) Sarawani Balochi production of word *guːr*

| Input:/guːr/ | *Diphthong | *[uː] | MAX-µ-IO | IDENT-IO[uː] |
|---|---|---|---|---|
| a.☞gʊr | | | * | * |
| b. guːr | | *W | L | L |
| c. guer | *W | | L | * |

(10) Sarhaddi Balochi production of word *guːr*

| Input: /*guːr* / | *[uː] | MAX-µ-IO | *Diphthong | IDENT-IO[uː] |
|---|---|---|---|---|
| a.☞*guer* | | | * | * |
| b. *guːr* | *W | | L | L |
| c. *gur* | | *W | L | L |

(11) Lashari Balochi production of word *guːr*

| Input: /*guːr* / | *[uː] | MAX-µ-IO | *Diphthong | IDENT-IO[uː] |
|---|---|---|---|---|
| a.☞*guər* | | | * | * |
| b. *guːr* | *W | | L | L |
| c. *gur* | | *W | L | L |

# References

Alderete J. (1999). *Morphologically Governed Accent in Optimality Theory*.Ph.D. dissertation, University of Massachusetts Amherst.

Alderete J., Beckman J., Benua, L., Gnanadesikan A., McCarthy J. & Urbanczyk S. (1999). “Reduplication with fixed segmentism” in *Linguistic Inquiry*, 30, pp. 327 – 364.

Arsenault P.E. (2012). *Retroflex Consonant Harmony in South Asia*. Ph.D. dissertation, University of Toronto.

Axenov S. (2006). *The Balochi Language of Turkmenistan: A corpus based grammatical description*. Studia Iranica Upsaliensia10, Uppsala: Acta Universitatis Uppsaliensis.

Baertsch, K. (2002). *An optimality theories approach to syllable structure: The split margin hierarchy*. Ph.D. dissertation, Indiana University.

Baranzehi A. (2003). “The Sarawani dialect of Balochi and Persian influence on it”. In K. Jahani& A. Korn (eds.), *The Baloch and Their Neighbors: Ethnic and Linguistic Contact in Balochestan in Historical and Modern Times*.Wiesbadan, pp. 75-111.

Barjasteh Delforooz B. (2010), Discourse features in Balochi of Sistan (Oral Narratives), Studia Iranica Upsaliensia 15, Uppsala: Acta Univesitatis Uppsaliensis.

Barker M. A &MengalA.k. (1969), *A Course in Baluchi*. Montreal: McGill University Press, 2 vols.

Blevins, J. (1995). “The syllable in phonological theory” in J. Goldsmith (ed.) *Handbook of Phonological theory*. Blackwell, pp. 206-244.

Blevins J. & Garrett A. (2004). “The evolution of metathesis” in B. Hayes, R. Kirchner & D. Steriade (eds.) *Phonetically based phonology*. Cambridge: Cambridge University Press, pp. 117-156.

Buckley E. (2011). “Metathesis” in M. van Oostendorp, K.J. Ein, E. Hume & K. Rice (eds.) *Companion to Phonology (III)*. Blackwell, pp. 1380- 1408.

Bybee J. (2005). “Restrictions on phonemes in affixes: A crosslinguistic test of a popular hypothesis”. *Linguistic Typology*, 9, pp. 165–222.

Bye P. (2011). “Dissimilation” in M. van Oostendorp, K.J. Ein, E. Hume & K. Rice (eds.) *Companion to Phonology (III)*. Blackwell, pp, 1408- 1434.

Calabrese A. A (2009). “Perception, production and acoustic inputs in loanword phonology” in A. Calabrese & W. L. Itzels (eds.) *Loan Phonology*. Amsterdam: John Benjamin, pp. 59-115.

Calabrese A. A & Itzels W.L. (2009). “Loan Phonology: Issues and controversies” in A. Calabrese & W. L. Itzels (eds.) *Loan Phonology*. Amsterdam: John Benjamin, pp.1-11.

Coetzee A, W. (2004). What it means to be a loser: non-optimal candidates in optimality theory. Ph.D. dissertation, University of Massachusetts Amherst.

Casil R. F. (2011). “Hiatus Resolution” in M. van Oostendorp, K.J. Ein, E. Hume& K. Rice (eds.) *Companion to Phonology (III).* Blackwell, pp. 1434-1461.

Chomsky N. & Halle M. (1968). *The sound pattern of English*. New York: Harper &Row.

Dames M. L. (1891). *A textbook of the Balochi language: consisting of miscellaneous stories, legends, poems, and a Balochi-English vocabulary, Lahore*.Punjab: Punjab Government Press.

Davis S. (2003). “The controversy over geminates and syllable weight” in C. Féry& R. van de Vijver (eds.) *The Syllable in Optimality Theory*. Cambridge: Cambridge University Press, pp.77-99.

Davis S. & Cho M.H. (2003). “The distribution of aspirated stops and /h/ American English and Korean: an alignment approach with typological implications”. *Linguistics*, 41–4, pp. 607-652.

Davis S. (2011). “Geminates” in M. van Oostendorp, K.J. Ein, E. Hume & K. Rice (eds.) *Companion to Phonology (III)*. Blackwell, pp. 873- 898.

Davis S. (2011). “Quantity” in J. Goldsmith, J. Riggle& A.L. C. Yu (eds.) *Handbook of Phonological Theory*. West Sussex:Wiley-Blackwell, pp. 103-140.

Elfenbein J. (1966). *The Balochi Language*: *A Dialectology with texts*. London: Royal Asiatic Society of Great Britain and Ireland, 1966.

Elfenbein J. (1989). “Baluchistan 3: Baluchi language and literature” in *Encyclopedia Irannica* 3, pp. 633-644.

Ein C.J & van der Hulst, H. (2001). *The Phonological structure of Words, an Introduction*. Cambridge: Cambridge University Press.

FéryC. (2003). “Onsets and Nonmoraic Syllables in German” in C. Féry& R. van de Vijver (eds.) *The Syllable in Optimality Theory*. Cambridge: Cambridge University Press, pp.213-238.

Fudge E. (1969). “Syllables”. *Linguistics*, 5, pp. 253-86.

Geiger W. (1889). “DialektspaltungimBalūčī”, Abhandlungen der I. Classe der Königlich Bayerischen Akademie der Wissenschaften, Reichterverlag, 18(I), pp. 65–92.

Goldsmith J. A. (1976). *Autosegmental phonology*. Ph.D. dissertation, MIT.

Grierson G. A. (1921). *Specimens of languages of the Eranian family*. Calcutta: Superintendent Government Printing.

Guy G. R. (1980). “Variation in the group and the individual” in W. Labov (ed.) *Locating Language in Time and Space*. New York: Academia, pp. 1-36.

Hamann S. R. (2003). *The Phonetics and Phonology of Retroflexes*. Ph.D. dissertation. LOT publications.

Harris J. (2011). “Deletion” in M. van. Oostendorp,K.J. Ein, E. Hume, and K. Rice (eds.) *Companion to Phonology (III)*, Blackwell. 1597- 1622.

Hayes B. (1989). “Compensatory lengthening in moraic phonology”. *Linguistic Inquiry*, 20, pp.253-306.

Hayes B. (1994). “Weight of CVC can be determined by context “in J. Cole & Ch. Kisseberth (eds.) *Perspectives in Phonology*. Stanford, pp.61-79.

Hayes B. (1995). *Metrical stress theory: principles and case studies*. Chicago: University of Chicago Press.

Hayes B. (2009). *Introductory phonology*. Willy-Blackwell publishing.

Hock H. H. (1985). “Regular metathesis”. *Linguistics*, 23, pp.529–546.

Hooper J.B. (1976). *An Introduction to Natural Generative Phonology*. New York: Academic Press.

Hopper P. J. &Traugott E. C. (2003). *Grammaticalization*. Cambridge: Cambridge University Press.

Hyman L. M. (1985). *A theory of Phonological Weight*. Dordrecht: Foris.

Jahani C. (1989). “Standardization and Orthography in the Balochi Language” (Studia Iranica Upsaliensia 1), Uppsala: Uppsala University.

Jahani C. (2001). “Balochi” in J. Garry & C. Rubino (eds.) *Facts about the World’s Languages: An Encyclopedia of Word’s Major Languages, Past and Present*. NewYork/ Dublin, pp. 59-64.

Jahani C. & Korn A. (2009). “Balochi” in G.Windfuhr (ed.), *Iranian languages*. London, New York: Routledge, pp. 634-692.

Jakobson R. (1966 [1990]). “Quest for the essence of language”. *Diogenes*,51, pp. 21–37. [Reprinted in Linda R.Waugh&Monique Monville-Burston (eds.), *On Language: Roman Jakobson*. Cambridge, Mass.: Harvard University Press.], 407–421.

Kager R. (1989). *A Metrical Theory of Stress and Destressing in English and Dutch.* Dordrecht: Fortis.

Kager R. (1999). *Optimality Theory*. UK: Blackwell.

Kawahara Sh. (2007). “Sonorancy and Geminacy” in University of Massachusetts Occasional Papers in *Linguistics 32*: Papers in Optimality III, Amherst: GLSA, pp.146-186.

Kang Y. (2011). “Loan Phonology” in M. van Oostendorp, K.J. Ein, E. Hume & K. Rice (eds.) *Companion to Phonology (IV)*. Blackwell, pp, 2258-2283.

Kaye J. (1990). “‘Coda’ licensing” in *Phonology 7*, pp. 301- 330.

Korn A. (2005). *Towards a Historical Grammar of Balochi*.Wiesbaden, Dr. Ludwig.

Labov W., Cohen, P., Robins, C. &Lewis, J. (1968). “A Study of the Non-standard English of Negro and Puerto Rican Speakers”. New York City. Volume 1, Philadelphia: U.S. Regional Survey.

Leech R. (1838), “Grammar of the Balochky language”, *Journal of the Royal Asiatic Society (Bengal)*, 7/2, pp. 608ff.

Levi J. (1985). *A metrical theory of syllabicity*.Ph.D. dissertation, MIT.

Lewis A. (1855), *Bilochi stories, as spoken by the nomad tribes of the Sulaiman Hills*, Allahabad.

Lombardi L. (1999). "Positional faithfulness and voicing assimilation in Optimality Theory". *Natural Language and Linguistic Theory*.17, pp. 267–302.

McCarthy J. & Prince A. (1986). Prosodic Morphology. Ms., University of Massachusetts, Amherst, and Brandeis University, Waltham, Mass. [Issued in 1996 as Technical Report 32, Rutgers University Center for Cognitive Science.]

McCarthy J. & Prince A. (1990). "Foot and word in Prosodic Morphology: The Arabic broken plural". *Natural Language & Linguistic Theory*, 8, pp.209–283.

McCarthy J. &Prince A. (1993a). "Generalized Alignment" in G.E.Booij& J. van Marle(eds.) *Year book of Morphology.* Dordrecht: Kluwer, pp.79-153.

McCarthy J. & Prince A. (1993b). "Two lectures on prosodic morphology". Handouts of two lectures at OTS/HIL workshop on Prosodic Morphology, Utrecht University, July 1994. [ROA-59, http://ruccs.rutgers.edu/roa.html]

Mockler E. (1877), *A grammar of the Baloochee language, as it is spoken in Makrān (ancient Gedrosia), in the Persi-Arabic character*. London: Henry S.King & Co.

Moradi M. (2012). *Morphological Description of Sarawani Balochi Dialect of Seb*. Unpublished MA Thesis. Azad University of Fars Research Center.

Muller J. (2001). *The phonology and phonetics of word-initial geminates*.Ph.D. dissertation, Ohio State University.

Okati F. (2012). *The vowel systems of five Iranian Balochi dialects*. Studia Iranica Upsaliensia 13, Uppsala: Acta Universitatis Uppsaliensis.

Pajak, Bozena. (2003). "Contextual constraints on geminates: The case of Polish. Proceedings of Annual Meeting", *Berkeley Linguistics Society 35*, (ROA- 1051.).

Patrick P. L. (1991). Creoles at the intersection of variable processes: -t, d deletion and past marking. Jamaican mesolect. Language Variation and Change, 3, pp. 171- 189.

Paul L. (2003), "The position of Balochi among Western Iranian languages: the verbal system", in C. Jahani&Korn A. (eds.), *The Baloch and Their Neighbours: Ethnic and Linguistic Contact in Balochistanin Historical and Modern Times*, Wiesbaden: Reichert Verlag, pp. 61–71.

Pierce E. (1874), "A description of the Mekranee-Beloochee dialect", *Journal of the Royal Asiatic Society* (Bombay), 11, pp. 1– 98.

Prince A. &Smolensky P. (1993). Optimality Theory: constraint interaction in generative grammar. Ms., Rutgers University, New Brunswick and University of Colorado, Boulder. [ Technical report no. 2, Rutgers University Center for Cognitive Science. Cambridge, Mass.: MIT Press.]

Prince A. (2000). *Comparative Tableaux*. Rutgers University, New Brunswick.

Orgun, C. O. (1996). Sign-baes morphology and phonology with special attention to optimality theory. University of California, Berkeley. (Ph.D. dissertation).

Rose Sh. (2000). "Rethinking geminates, long-distance geminates, and OCP". *Linguistic Inquiry*, 31, pp. 85-122.

Selkirk, Elizabeth O. (1984a). "On the major class features and syllable theory" in Mark Aronoff and Richard T. Oerhle (eds.) *Language sound structure: studies in phonologyand presented to Morris Halle by his teacher students*. Cambridge, MA, MIT Press, pp. 107-136.

Soohani B, Ahangar, A.A & van Oostendorp, M. (2011). "Stress Pattern System in Sarawani Balochi". *Iranian Journal of Applied Langugae Studies*, Vol, 13. No.1, pp. 151-194.

Steriade D. (1982). *Greek prosodies and the nature of syllabification.*Ph.D. dissertation, MassachusettsInstitute of Technology. Published 1990, New York: Garland. Steriade, Donca (2001a) "Directional Asymmetries in Place Assimilation." In E. Hume &K. Johnson (eds.) *The role of speech production in phonology*. San Diego. Academic Press, pp.219-250.

Topintzi N. (2011). Onsets. In M. van Oostendorp, K.J. Ein, E. Hume& K. Rice (eds.) *Companion to Phonology(II).* Blackill. 1285- 1308.

Urbanczyk S. (2007). "Reduplication" in Paul de Lacy (ed.) *The Cambridge Handbook of Phonology.* Cambridge University Press, pp. 473-493.

Ussishkin A. (2007). "Morpheme position" in Paul de Lacy (ed.) *The Cambridge Handbook of Phonology.* Cambridge University Press, pp.457-472.

Vennemann T. (1972). "On the theory of syllabic phonology". *Linguistische Berichte*, 18, pp.1-18.

Watanabe H. (2003). A morphological description of Sliammon, Mainland Comox Salish, with a sketch of syntax. Endangered Languages of the Pacific Rim. Kyoto Japan: Nakanishi Printing Co. Ltd.

Yip M. (1992). "Reduplication with Fixed Melodic Material Feature". *North East Linguistic Society* 22, pp.459-76.

Zec D. (2007). The syllable in Paul de Lacy (ed.) *The Cambridge Handbook of Phonology*. Cambridge University Press, pp. 160-194.

Zec D. (2011). Quantity-sensitivity in M. van Oostendorp, K.J. Ein, E. Hume& K. Rice (eds.) *Companion to Phonology(II).*Blackwell, pp. 1335- 136.

Zanuttini, A. (2008). Encoding the addressee in the syntax: Evidence from English imperative subjects. *Natural Language and Linguistic Theory,* 26:185–218.

Zec, Draga. (2007). The syllable in Paul de Lacy (ed.) *The Cambridge Handbook of Phonology.* Cambridge University Press, pp.160-194.

Zsiga E. C. (2011). "Local Assimilation" in M. van Oostendorp, K.J. Ein,E. Hume& K. Rice (eds.) *Companion to Phonology(III).* Blackwell, pp. 1919-1945.

# Samenvatting

Deze studie onderzoekt het fonologische systeem van drie Beloetsji dialecten in Iran: Mrjaveh Sarhaddi Beloetsji (MSB), Sarawani Beloetsji (SB) en Lashari Beloetsji (LB). De drie voor deze studie geselecteerde Iraanse Beloetsji dialecten (IBDs) worden gesproken in respectievelijk Mirjaveh, Sarawan, en Lashar in de provincies Sistan en Beloetsjistan in Zuidoost-Iran. Zoals de titel van deze disseratie aangeeft behandelen we deze dialecten zowel vanuit descriptief als theoretisch perspectief, omdat deze elkaar complementeren en de taal Beloetsji verbinden met het universeel taalsysteem. We trachten een formele en zo precies mogelijk beschrijving en analyse van de grammaticale eigenschappen van het klanksysteem te geven.

Deze dissertatie behandelt de segmentele fonologie van de drie Beloetsji dialecten,de foneeminventaris en de allofonische alternantie, in Optimaliteitstheorie. Hoofdstuk 2 behandelt de suprasegmenteleen prosodische fonologie. In Hoofdstuk 3 beschrijven we de syllabestructuur, geminaten, en klemtoonsysteem in de dialecten, en analyseren dezevervolgens in Optimaliteitstheorie. Hoofdstuk 4 beschrijft en analyseert de fonologische processen in de drie dialecten die in de data geobserveerd worden, onder andere metathesis, locale assimilatie, hiatus, en deletie. Hoofdstuk 5 is gewijd aan de studie van de fonologie-morfologie interface in IBDs, zoals reduplicatie, wortel-affix asymmetrie, fonologisch geconditioneerde allomorf selectie en fonologische gevoeligheid voor morfologische structuur. Hoofdstuk 6 bevat de algemene conclusie die de overeenkomsten en verschilllen tussen de dialecten beschrijft (met de nadruk op microvariatie) en vat de studie samen.

# Curriculum Vitae

Bahareh Soohani was born on May 21, 1978 in Tehran, Iran. She began studying English translating in 1996 at Islamic Azad University, Tehran, Iran. She obtained her Bachelor's degree in 2000 Right after that, she started a Master's degree in General linguistics at Islamic Azad Universiy, Tehran, Iran. She obtained her Master's degree in 2004 with a dissertation entitled "The Phonology of Balochi of Sarawan Variety: A linear and Nonlinear Approach". In 2008, she started her second master in Structure and Variation in the Languages of the World at the Leiden University Center for Linguistics (LUCL). In 2010, she obtained her MPhil degree with a dissesrtaion entitled "Stress Pattern System in Central SarawaniBalochi". From 2010 till 2017 she carries out her PhD project at the Leiden University Center for Linguistics (LUCL).