Investigating the Processes of Dissimilation and Insertion in Sistani Balochi Dialect Based on Generative Phonology

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Abstract

The purpose of this research is to study the processes of dissimilation and insertion in Sistani Balochi Dialect based on Generative Phonology. A central idea in the theory of Generative Phonology is to find the underlying representation of phonemes according to the phonetic representation. In order to ensure the reliability of the data, a data corpus was collected from 50 SB speakers.The results show that the phonological process of dissimilationoften occurs between two phonemes of /l/ and /r/ because these two sounds belong to the same natural class. In addition, the results show that the process of insertion occurs both in consonants and vowels. Consequently, it causes the change of syllable structure and re-syllabification in SB. Insertion may occur in word-initial, word-medial and word-final positions.

keywords: dissimilation; insertion; Generative Phonology; Sistani Balochi

1. Introduction

According to Elfenbein (1966: 10), Balochi is regarded as one of the Modern Iranian Languages. In addition, it is classified within the Northwestern group of Iranian languages. Its Middle Iranian ancestor is closer to Parthian language than Middle Persian. Nowadays, this language is spoken in Iran, Pakistan, Afghanistan, Turkmenistan, India, Oman, Persian Gulf States, Eastern part of Africa, North America, Europe and Australia (Jahani and Korn, 2009: 634). This language has different dialects and accents which are influenced by local and standard languages. Korn (2003: 117) writes "this language has common features with Kurdish, Zazaki and Middle Iranian Parthian language".

Since no linguistic study has been done in the field of phonological processes on Sistani Balochi (SB) dialect before, the researchers of this study have tried to study and analyze some of the phonological processes in this dialect. In addition, the study of the phonological processes of this dialect is very effective in recognizing the nature of past changes and reconstructing Old Iranian languages and can solve some phonological and morphological problems. Furthermore, this study serves the language and culture of this area. In the meantime, SB is very interesting from a comparative and historical point of view, because it preserves archaic features in phonology.

2. Theoretical Framework

The major work through which the rules and principles of the Generative Phonology was presented, was "*the Sound Pattern of English (SPE)*" by N. Chomsky and M. Halle in 1968, which is the main theoritical framework for this study. In SPE, Each phoneme is a picture of a set of phonological properties which exist in the mind of people and it is a bundle of distinctive features. In fact, distinctive features are considered as the smallest elements in the linguistic studies. Furthermore, each phoneme is stored in the mind in two-value features (+ or -) and the information the brain sends to the vocal apparatus to articulate a given sound is presented in memory in the form of distinctive feature matrix. Thus, elements of underlying representations and underlying elements are rewritten in the framework of two-value features. Rewriting of phonological segments in matrices of two-value features is done to classify phonological oppositions which occur in the language. The rules used in SPE are linear and act in order; that is, a central idea in the theory of Generative Phonology is to find the underlying representation of phonemes according to the existent alternation of forms and reach to the phonetic representation

by defining a phonological rule which acts upon an underlying form. So, there are two main rules which explain different types of phonological processes. Some of them are context-free like: [+son]→[+voice], A→B and some are context-dependent like: A→B/—C.

3. Methodology

This research is both theoretical and qualitative in nature. It is also analytical.

3.1. Informants

In order to ensure the reliability of the data, a range of ages are represented in the corpus: data are gathered by interviewing 50 SB Speakers aged 15 to 65 in Zabol, Zahak, Hirmand, Hamoon and Nimrooz cities.

3.2. Instrumentation

In order to collect data, the researchers have used: a) the speech of the informants by recording their speech and conversations (using questionnaires of Parmoun (2006), b) written documents such as assays and some other written works like BalochiGalband dictionary (Rzehak, 2007) which are written about this language. The researchers have directly interviewed the informants and a data corpus consisting of 15 hours of digital recordings have been gathered from a number of different parts of the area. Then the data are transcribed based on IPA symbols.

4. Sistani Balochi Phonemes

The phonemes of SB dialect have been derived using minimal pairs and the distribution of phonemes in initial, medial and final position. So, there are 23 consonants and 8 pure vowels.

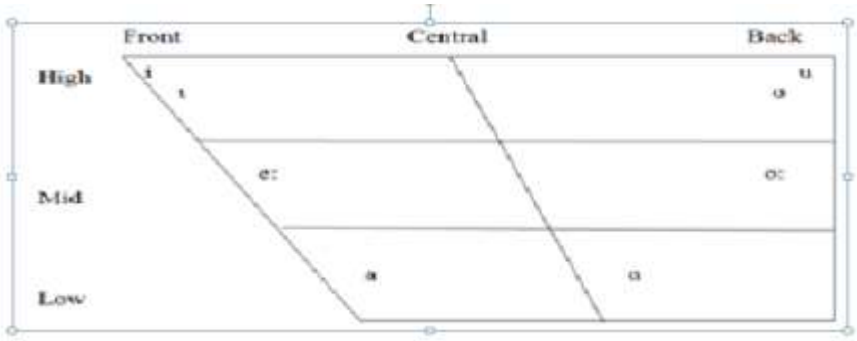
Table 1. SB Consonants

	Bilabial	*Dental*	*Alveolar*	*Retroflex*	*Palatal*	*Velar*	*Uvular*	*Glottal*
Plosive	p b	t d		ʈ ɖ		k g		

Fricative			s z		ʃ Z		χ	h
Affricate					ʧ ʤ			
Nasal	m	n						
Trill			r	ɽ				
Lateral			l					
Glide					j	w		

SB Consonants (proposed by Doosty, 2016:126)

Table 2. SB vowels



SB Vowels (proposed by Doosty, 2016:135)

5. Review of Literature

No description of Sistani Balochi has been done in two recent decades; especially, in phonology of this dialect (Doosty, 2016:48). However, some of the other Balochi dialects have been described and studied which are mentioned:

Axenov (2006), in his study, has described phonological, morphological and syntactic structure of Balochi of Turkmenistan in accordance with the principles of descriptive linguistics. He has used methods of field linguistics, which are based on both spontaneous and purposeful recording of speech. The results of his study show that the vowel system of BT has kept historical length and has eight pure vowels /a/, /ɑ/, /ɪ/, /i/, /ʊ/, /u/, /eː/, /oː/ and two falling diphthongs: /ay/ and /aw/, which can also be classified as a sequence of the short vowel /a/ and the approximants /y/ and /w/. In addition, Axenov has introduced 26 consonants in BT including: /p/, /b/, /t/, /d/, /ʈ/, /ɖ/, /k/, /g/, (/q/), /ʧ/, /ʤ/, (/f/), /s/, /z/, /ʃ/, /ʒ/, /χ/, /ʁ/, (/h/), /m/, /n/, /l/, /r/, /ɽ/, /w/, /j/. He has not mentioned phonological processes except epenthesis. **Ghasemzadeh** (2011) has described Dalgan Balochi dialect in accordance with the principles of descriptive linguistics. The purpose of this research has been to study phonological, morphological and syntactic structure of sentences in this dialect. She has used fieldwork and documental methods to collect data. The results show that there are 20 consonants including: /p/, /b/, /m/, /v/, /t/, /d/, /s/, /z/, /r/, /n/, /l/, /ʃ/, /ʧ/, /ʤ/, /k/, /g/, /gw/, /j/, /ʔ/, /h/; 8 vowels: /a/, /e/, /o/, /ɑ/, /i/, /u/, /ɪe/, /ʊe/in Dalgan Balochi. Ghasemzadeh believes that the syllable structure of this dialect is based on CV(C)(C); in other words, vowels are not seen in initial position of syllable or words. She has referred to the most important phonological processes like: assimilation, dissimilation, addition, deletion and metathesis without any theoretical framework. **Okati** (2012) has acoustically studied vowel systems of five Iranian Balochi dialects in Sistan, Khash, Sarawan, Iranshahr and Chabahar. She has collected the data using fieldwork. The results show that three vowel systems can be found in these areas: 1- the vowel system in Sistan, sarawan and Chabahar including: /i/, eː/, /e/, /ɑ/, /a/, /oː/, /o/, /u/; 2- in Khash: /i/, /ɪe/, /e/, /ɑ/, /a/, /ʊe/, /u/, /ʊ/; and 3- in Iranshahr: /i/, /eː/, /e/, /ɑ/, /a/, /oː/, /u/, /ʊ/. **Sheikhzadeh** (2012) has comparatively studied sound system, morphology and sentence structure in five accents of Sarawani Balochi dialect without any theoretical framework. She has collected the data using fieldwork and library methods. The results show that there are 27 consonants including: p, b, t, d, ʈ, ɖ, k, g, (q), ʔ, (f), s, z, ʃ, ʒ, h, ʧ, ʤ, (χ), (ɢ), r, ɽ, l, m, n, w, j; six pure vowels: e, a, o, ɑ, i, u; two diphthongs: eɪ, əʊ and some allophonic vowels: i, u in the accents of Sarawani Balochi dialect. Sheikhzadeh has introduced some phonological processes like: assimilation, dissimilation, deletion and metathesis without any theoretical framework. **Hashemzehi** (2012) has comparatively studied sound system, morphology and sentence structure in five accents of Sarhaddi Balochi dialect in Khash without any theoretical framework.

She has collected the data using fieldwork and library methods. The results show that there are 25 consonants including: p, b, t, d, ʈ, ɖ, k, g, q, ʔ, s, z, ʃ, ʒ, h, ʧ, ʤ, χ, r, ɽ, l, m, n, w, j; six pure vowels: a, e, o, ɑ, i, u; three diphthongs: ej, ow, aw and some allophonic vowels: ɪ, ʊ, o:, e in the accents of Sarhaddi Balochi dialect in Khash. Hashemzehi has introduced some phonological processes like: assimilation, dissimilation and metathesis without any theoretical framework and analysis.

6. Analyses of the Data

To ensure accuracy of the procedure of changes, phonetic representation of different words (about 3000 words) are compared to determine the environment of a phonological process, after that, an alternation is considered between different forms with similar meanings, and then, two hypotheses are posed about what is considered as underlying representation. Based on evidence and examples of violation, one of them may be rejected and the other may be confirmed and then its rule is provided.

6.1. Dissimilation

Dissimilation refers to processes in which sounds become more auditorily distinct from other sounds in their environment. This allows for easier speech perception (Katamba, 1996: 94). For example, if r→l happens in a form containing another r, this is a dissimilation, e.g. arbor → arbol (Lass, 1988: 171).

Table 3. Alternation of two same contiguous and noncontiguous consonants inside a morpheme.

UR of SB	PR of SB	Loanwords/SP	Meaning
taraktɔr	traχtɔl	Tractor	"tractor"
trɒngɒɽ	trɒngɒl	trɒngɒɽ	"hail, brimmed (with tears)"
dallɑl	dallɑr	dallɑl	"broker, dealer, go-between"
zɪrar	zɪlar	zarar	"damage"
dalil	dalir	dalil	"reason, cause"
zarwaraχ	zarbalaχ	zarvaraɢ	"silver paper, aluminum foil"

1- Based on “phonetic plausibility criterion”, consonants [r] and [l] belong to liquids and they form a natural class. So, these two consonants can substitute each other in common phonological

processes. 2- Substitution of liquids instead of each other is also seen in cross-linguistics like English (lass, 1988: 171); Sistani dialect of Adimi (Kambuziya and her colleagues, in press). Therefore, the words which have two identical [r] or [l], these two sounds are dissimilated.

6.2. Insertion

Insertion is the opposite of deletion which is regarded as a lenition process. Therefore, Insertion is the addition of a sound in the word. Insertion of consonants and vowels are very common in English like *people* which is pronounced [pipəl] (Crystal, 2008: 123). Epenthesis is used in phonetics and phonology to refer to a typeof intrusion, where an extra sound has been inserted in a word (Crystal, 2008: 171). Burquest (2001: 173) claims that "epenthesis is usual with vowels, where a vowel is inserted to breakup a consonant cluster".

6-2-1- Consonant Insertion

Table 4. Insertion of coronal [r] in the environment of a vowel and a consonant

UR of SB	PR of SB	Loanwords/SP	Meaning
nɑzʊk	nɑzʊrk	nɑzok	"thin, delicate, tender, fine"
ɡeːʃɑɡ	ɡreːʃɑɡ	biʃe	"wood, forest, thicket"
nɑzʊki	nɑzʊrki	nɑzoki	"thinness, delicateness, fineness"
sʊm	srʊm	som	"hoof"
sɑp	srɑp	saf	"line, row"
tʊnd	trʊnd	tond	"sharp, fast, quick, speed, tight, heavy"
tʊndi	trʊndi	tondi	"sharpness, speedy"
tʊndɑp	trʊndɑp	—	"wine"
zʊnbɪʃ	zrʊmbɪʃ	ʤonbeʃ	"movement"
zʊnb	zrʊmb	—	"disabled"

Regarding table (4), an alternation is seen between ø~r. Therefore, two hypotheses are posed:

Hypothesis 1: Coronal /r/ is in underlying representation and a rule is needed to delete it.

$$r \rightarrow \emptyset \; / \; \left\{ \begin{array}{l} \#C_{[-son]} \_\_\_\_ V \\ V \_\_\_\_ C_{[-son]}\# \end{array} \right\}$$

Hypothesis 2: Coronal [r] is not in underlying representation, but a rule is needed to insert it.

$$\emptyset \rightarrow r \; / \; \left\{ \begin{array}{l} \#C_{[-son]} \_\_\_\_ V \\ V \_\_\_\_ C_{[-son]}\# \end{array} \right\}$$

1- Table (4) shows that [r] is inserted in some loanwords which begin or end to an obstruent and a consonant cluster is formed in initial or final position of the words. The insertion of [r] between a vowel and a consonant is based on the Sonority Sequencing Principle because the sonority decreases towards margins and this decrease happens smoothly. 2- Insertion of [r] is seen in cross-linguistics such as English (Jensen, 2004: 181), but in English, [r] is inserted between two vowels in the word boundary. Its phonological rule is as follows:

Rule (1) Insertion of Coronal [r] $\quad \emptyset \rightarrow r \; / \; \left\{ \begin{array}{l} \#C_{[-son]} \_\_ V \\ V \_\_ C_{[-son]}\# \end{array} \right\}$

Rule (1) shows that the coronal [r] is inserted as the second member of cluster in initial position or as the first member of cluster in final position of the words.

Applying rule (1) can be illustrated using the derivation of the word /nɑzʊk/ "thin, delicate, tender, fine" as follows:

(1)	Underlying Representation (UR)	/#nɑzʊk#/
	Rule (1)	nɑzʊrk
	Phonetic Representation (PR)	[nɑzʊrk]

Table 5. Insertion of glide [j] between two vowels in the morpheme boundary

UR of SB	PR of SB	Loanwords/SP	Meaning
bɑlɑ+j+i	bɑlɑji	bɑlɑ	"northern, upper"
bannɑ+j+i	bannɑji	bannɑ	"builder"
bʊndʒɑ+j+i	bʊndʒɑji	—	"central"
pɑtʃɑ+j+i	pɑtʃɑji	fɑtehe	"mourning"

padarɑ+j+i	padarɑji	—	"clearness, obviousness"
pe:rzo:+j+i	pe:rzo:ji	—	"favour, grace, wished"
ʤɑlɑ+j+i	ʤɑlɑji	—	"southwards"
ʤɑ+j+i	ʤɑji	ʤɑji	"local, from here, native"
ʤɪtɑ+j+i	ʤɪtɑji	ʤedɑji	"isolation, separation, parting"
de:mɑ+j+i	de:mɑji	—	"ahead, progress, forward"
rʊswɑ+j+i	rʊswɑji	rosvɑji	"infamy, public disgrace"
ro:ʃnɑ+j+i	ro:ʒnɑji	rowʃanɑji	"lightness, luminosity"

Based on table (5), there is an alternation between ø→j that for determining underlying representation, two hypotheses are posed:

Hypothesis 1: Glide [j] isnot in underlying representation, but it is inserted in phonetic representation by applying a phonological rule. ø→j / V — + V $_{[+high]}$

Hypothesis 2: Glide /j/ is in underlying representation but it is deleted in phonetic representation using a phonological rule. j→ø / V — +V $_{[+high]}$

1- Since SB is extremely influenced by Standard Persian, sometimes hiatus in the morpheme boundary is regarded as the violation of SB phonotactics and an unacceptable vowel sequence is formed. 2- Evidence shows that some of the words which end to back vowels /ɑ/ and /u/, they have originally ended to front glide [j] in Middle period and early New Persian; therefore, while affix [-i] was added to the stem, hiatus wasnot occurred. Sadeghi (1978: 72) writes: "in words such as /ruj/ "face", /muj/ "hair", /ʤɑj/ "place" that glide [j] has been occurred after long back vowels /ɑ/ and /u/, they are even today pronounced with [j] in Afghanistan while [j] has been deleted after long vowels in Iran".So, many of the words which usually end to long back vowels have originally had glide [j] and nowadays there is a hidden [j] in final position of these words. When an affix which begins with a vowel is added to the stem, this glide reappears and functions as anepenthesis. When a morpheme ends to long back vowels and another morpheme begins with a vowel, the glide [j] is analogically inserted as an epenthesis like the above-mentioned words. Consequently, hypothesis (1) is confirmed and its phonological rule can be written as follows:

Rule (2) Insertion of glide [j] Ø→j / V—+V$_{[+high]}$

Rule (2) expresses the insertion of glide [j] between two vowels when the first morpheme ends to a vowel and the second morpheme begins with a vowel.

Applying rule (2) can be illustrated by derivation of /pɑtɪjɑ+i/ "mourning" as follows:

(2)	UR	/#pɑtɪjɑ+i#/
	Rule (2)	pɑtɪjɑji
	PR	[pɑtɪjɑji]

Table 6a. Insertion of velar stop [k] preceding a vowel in the initial position of the word

UR of SB	PR of SB	Loanwords/SP	Meaning
ɑjag,ɑtɪn	kɑant	ɑmadan	"to come, wish to"
ɑzmɑjag	kɑzmɑjag	ɑzmɑjeʃ	"test, examine, check, verify"
ɑzmutɪn	kɑzmutɪn	ɑzmudan	"test, verify"
arzag	karzag	arzeʃ	"be worth"
arzɪtɪn	karzɪtɪn	arzidan	"to be worth"
ʊʃkɪtɪn	kʊʃkɪtɪn	ʃanidan	"to hear"
ʊʃkag	kʊʃkag	ʃanidan	"to hear"
ʊʃke:ntɪn	kʊʃke:ntɪn	—	"to announce, annunciate, promulgate"
ʊʃke:nag	kʊʃke:nag	—	" to announce, annunciate, promulgate"
ɪllag	kɪllag	behel	"to put, lay, leave"
o:ʃtɑre:ntɪn	ko:ʃtɑre:ntɪn	—	"to put sb on his/her foot"
o:ʃtɑre:nag	ko:ʃtɑre:nag	—	"to put sb on his/her its foot"

With regard to table (6a), an alternation is seen between ø~k that two hypotheses are posed in order to determine underlying representation:

Hypothesis 1: Velar stop /k/ is in underlying representation; so a rule is needed to delete it preceding a vowel in initial position of word. k→ø/#—VC

Hypothesis 2: Velar stop [k] is not in underlying representation; so a rule is needed to insert it preceding a vowel in initial position of word. ø→k/#—VC

1- With regard to "phonetic plausibility criterion", the initial position of word is the environment of fortition or strengthening. Therefore, insertion often occurs in this position, not deletion. 2- Insertion of a consonant is a natural phenomenon in the initial position preceding a

vowel which is also seen in some of the other languages and dialects. 3- This consonant is added to the verbs which are pronounced with or without voiceless velar stop [k] in the initial position of the words. Consequently, hypothesis (2) is confirmed and the rule of this process is as follows:

Rule (3) Insertion of voiceless velar stop Ø→k/ # —V

Rule (3) shows the insertion of velar stop [k] preceding a vowel in initial position of word.

Applying rule (3) can be shown using the derivation of the word /ɑzmutɪn/"test, verify" as follows:

(3)	UR	/#ɑzmutɪn#/
	Rule (3)	kɑzmutɪn
	PR	[kɑzmutɪn]

Table 6b. Insertion of voiceless velar stop [k] after voiceless coronal fricatives

UR of SB	PR of SB	Loanwords/SP	Meaning
kargo:ʃ	kargo:ʃk	χarguʃ	"rabbit"
ʧaplus	ʧaplusk	ʧɑplus	"flaterrer"
ʧaplusi	ʧapluski	ʧɑplusi	"flattery"
mʊʃ	mʊʃk	muʃ	"mouse"
hanas	hanask	nafas	"breath"
ɪljɑs	ɪljɑsk	eljɑs	"a water bird"
makɪs	makɪsk	maɟas	"fly"
kʊro:s	kʊro:sk	χorus	Cock

Based on table (6b), there is an alternation between ø~k. Determining underlying representation, two hypotheses are posed:

Hypothesis 1: Velar stop /k/ is in underlying representation and it is deleted in phonetic representation by applying a rule. k→ ø / Vs,ʃ — #

Hypothesis 2: Velar stop [k] is not in underlying representation and it is inserted in phonetic representation by applying a rule. ø →k/ Vs,ʃ — #

The table (6b) shows that: 1-In comparison with the "phonetic plausibility criterion" in which the final position is regarded as lenition or weakening position, here fortition or strengthening

has been occurred. 2- Insertion of the voiced velar stop [k] after voiceless coronal fricatives /s/ and /ʃ/ forms a consonant cluster in final position of the words. This process is a natural phenomenon which is commonin other Iranian dialects like Sistani dialect of Adimi (Kambuziya and her colleagues, in press). This insertion is based on Sonority Sequencing Principle. So, hypothesis (2) is confirmed and its rule is as follows:

Rule (4) Insertion of voiceless velar stop $\text{ø} \rightarrow \text{k} \; \underset{\text{Vs,ʃ}}{\text{\_\_\_\_}} \; \text{\#}$

Rule (4) shows the insertion of velar stop [k] after voiceless coronal fricatives /s/ and /ʃ/ as the second member of cluster in the final position of the word. This rule expresses that the insertion of velar stop [k] and formation of consonant cluster does not violate Sonority Sequencing Principle but it is against the "principle of least effort"

Applying rule (4) can be shown by the derivation of the word /kargo:ʃ/ "rabbit" as follows:

(4)	UR	/#kargo:ʃ#/
	Rule (4)	kargo:ʃk
	PR	[kargo:ʃk]

Table 7. Insertion of coronal stop [d] after coronal nasal /n/ in the final position of word

UR of SB	PR of SB	loanwords/SP	Meaning
ʧaman	ʧamand	ʧaman	"lawn, meadow"
mʊzɪn	mʊzɪnd	—	"recognition, knowing"
wɪdʒɪn	wɪdʒɪnd	vidʒen	"thirteen"
ʃɪn	ʃɪnd	ʃen	"sand"
sɪn	sɪnd	sen	"age"

Considering table (7), there is an alternation between ø~d that two hypotheses are considered:

Hypothesis 1: Coronal stop /d/ is in underlying representation and it is deleted in phonetic representation by applying a rule. $\text{d} \rightarrow \text{ø} \; / \; \text{Vn} \; \text{—} \; \text{\#}$

Hypothesis 2: Coronal stop [d] is not in underlying representation and it is inserted in phonetic representation by applying a rule. $\text{ø} \rightarrow \text{d} \; / \; \text{Vn} \; \text{—} \; \text{\#}$

1- Thecorpus internal evidence indicates that all consonant clusters of /-nd#/ in the final position of the words in which the first member is coronal nasal /n/ and the second member is voiced coronal stop /d/, the consonant cluster is preserved without cluster reduction. They are not devoiced in phonetic representation except in the word [pant] "advice" which is a loanword. 2- Some of the words which end to coronal nasal /n/ -like the words which have consonant cluster /-nd#/ in final position- is analogically inserted a voiced coronal stop [d] in final position;of course, this rule is not general because there are some simple words which end to the coronal nasal /n/, but thevoiced coronal stop [d] is not inserted such as: /bʊn/ "root, foundation", /pɑn/ "betel (Piper betle) leaf". 3- Some of the words which end to coronal nasal /n/ originally have double /n/ (gemination) in underlying representation. In this cases, the process of degemination occurs in phonetic representation like: /sɯnn/→[sɯnd] "age". 4- Insertion of the voiced coronal stop [d] is seen in some of the other Iranian dialects like: Sistani Dialect of Adimi (Kambuziya, in press). Therefore, its rule is as follows:

Rule (5): Insertion of coronal stop [d] Ø→d/Vn—#

$$Ø \rightarrow \begin{bmatrix} +cons \\ +ant \\ +cor \\ -cont \\ -son \\ +voice \end{bmatrix} / [+syll] \begin{bmatrix} +cons \\ +cor \\ +nas \end{bmatrix} — \#$$

Rule (5) shows the insertion of the voiced coronal stop [d] after coronal nasal /n/ in final position of word as the second member of consonant cluster.

Applying rule (5) can be shown using the derivation of word /ʧaman/ "lawn, meadow"

(5)	UR	/#ʧaman#/
	Rule (5)	ʧamand
	PR	[ʧamand]

Table 8. Insertion of glottal fricative [h] preceding a vowel in initial position of word

UR of SB	PR of SB	Middle Persian	loanwords/SP	Meaning
arra	harrag		Are	"saw"
asp	hasp	asp	asb	"horse"
anɑr	hanɑr		anɑr	"pomegranate"
ɑro:s	hɑro:s		aro:s	" wedding"
ɑparin	hɑparin		ɑparin	"praise, bravo"

Regarding the table (8), an alternation is seen between ø~h that two hypotheses are posed:

Hypothesis 1: Glottal fricative /h/ is in underlying representation and it is deleted in phonetic representation by applying a rule. h→ø / #—VC

Hypothesis 2: Glottal fricative [h] is not in underlying representation and it is inserted in phonetic representation by applying a rule. ø→h / #—VC

Table (8) states that: 1- based on "phonetic plausibility criterion", the word initial is strengthening (fortition) position; therefore, the frequency of insertion is more than deletion in initial position of the word. 2- Since a large number of words have glottal fricative in initial position in SB, the glottal fricative [h] is analogically inserted in initial position of some of the other words. 3- Since no syllable or word begins with a vowel in Standard Persian, the glottal stop [?] is obligatorily inserted in phonetic representation. Because glottal stop [?] does not exist in SB phonological inventory, the glottal fricative [h] is inserted instead. Of course, insertion of the glottal fricative [h] is not general in the initial position of the words which begin with a vowel like: /ɑrt/ "flour", /ɑbɑt/ "habitable, cultivated". Therefore, hypothesis (1) is confirmed and its rule is as follows:

Rule (6) Insertion of glottal fricative [h] Ø ⟶ h/#—V

$$\emptyset \longrightarrow \begin{bmatrix} -\text{son} \\ -\text{low} \\ -\text{voice} \\ -\text{syll} \end{bmatrix} / \#\text{——}[+\text{syll}]$$

Rule (6) expresses the insertion of the glottal fricative ion of the word.

Applying rule (6) can be illustrated using the derivation word /arra/ "saw" as follows:

(6)	UR	/#arra#/
	Rule (6)	harra
	PR	[harra]

Table 9. Insertion of coronal nasal [n] in the environment between a vowel and coronal fricative /z/ within a syllable or in the syllable boundary

UR of SB	PR of SB	loanwords/SP	Meaning
trɑzu	trɑnzu	tarɑzu	"scale"

dwɑzda	dwɑnzda	davɑzde	"twelve"
se:zda	se:nzda	sizde	"thirteen"
bɑzʊl	bɑnzʊl	bɑzu, bɑl	"arm, wing"
trɪzʊk	trɪnzʊk	—	"droplet"
po:z	po:nz	—	"nose"
trɪzag	trɪnzag	—	"well (from sth), sputter; depart, separate"
trɪzɪtɪn	trɪnzɪtɪn	—	"well (from sth), sputter; depart, separate"
kɪzɪtɪn	kɪnzɪtɪn	χazidan	"crawl, sneak"
kɪzag	kɪnzag	χazidan	"crawl, sneak"

Based on table (9), there is an alternation between ø~n; therefore, two hypotheses are considered to determine underlying representation.

Hypothesis 1: Coronal nasal /n/ is in underlying representation and a rule is needed to delete it in phonetic representation. n→ø/ V—z

Hypothesis 2: Coronal nasal [n] is not in underlying representation and a rule is needed to insert it in phonetic representation. ø→n/ V—z

Insertion of the coronal nasal [n] in the environment between a vowel and coronal fricative /z/ within a syllable or in the syllable boundary in simple words (often nouns) shows two special points in SB: 1- presence of nasal [n] between a vowel (as the necleus of the first syllable) and obstruent /z/ cause a smooth sonority from necleus toward coda. 2- With regard to CVCas the most frequent syllable structure in SB, CV syllables are often turned into CVC syllables by inserting the coronal nasal [n] between a vowel and the coronal fricative /z/ in the first syllable of the word because most of the first syllables are open. Therefore, the insertion of the coronal nasal functions as the coda of the first syllable most of the time. In addition, the corpus internal evidence indicates that the coronal nasal [n] isnot inserted in words /mʊzd/ "wage" although a vowel and the obstruent /z/ in the first syllable of the words. Because two consonants utmost occur in the coda and this insertion violates SB phonotactics.

Rule (7) Insertion of coronal nasal [n]

$$O \rightarrow n / V — z \begin{Bmatrix} \# \\ V \end{Bmatrix}$$

$$\emptyset \rightarrow \begin{bmatrix} +nas \\ +cor \end{bmatrix} / [+syll] — \begin{pmatrix} +cor \\ +cont \\ +cons \\ -son \\ +voice \end{pmatrix} \begin{Bmatrix} \# \\ [+syll] \end{Bmatrix}$$

Rule (7) indicates that if a mono-syllabic or poly-syllabic morpheme ends to the voiced coronal fricative /z/ or an open syllable in the environment between a vowel and a consonant, the coronl nasal [n] is inserted and this insertion is based on Sonority Sequencing Principle.

Applying rule (7) can be illustrated using the derivation of word /kɪzɪtɪn/ "crawl, sneak" as follows:

(7)	UR	/#kɪzɪtɪn#/
	Rule (7)	kɪnzɪtɪn
	PR	[kɪnzɪtɪn]

6-2-2- Vowel Insertion

Table 10a. Insertion of short vowel [ɪ]between two coronalobstruents in morpheme boundary

UR of SB	PR of SB	Loanwords/SP	Meaning
re:s +-t	re:sɪt	—	"s/he spun, yarned"
ras +-t	rasɪt	rasid	"s/he arrived"
lo:ʈ+ t	lo:ʈɪt	—	"s/he wanted, intended, needed, asked, requested, begged"
rɪnd+-t	rɪndɪt	—	"s/he combed"
sɪpɑr+-t	sɪpɑrɪt	sepord	"deliver, handover"
hiʒ+-t	hiʒɪt	—	"It roared, It brwaled"
jɑl+-t	jɑlɪt	—	"s/he watched, looked"

Table 10b. Insertion of short vowel [ɪ] between three consonants in the morpheme boundary

UR of SB	PR of SB	Loanwords/SP	Meaning
dʊzz +-t	dʊzzɪt	Dozdid	"s/he stole"
kaʃʃ+-t	kaʃʃɪt	kaʃɪd	"s/he pulled"
kʊʃk+-t	kʊʃkɪt	—	"s/he heard"
ʤang +-t	ʤangɪt	ʤangid	"s/he foughtˈ
ʤʊkk +-t	ʤʊkkɪt	—	"a camel kneeled"
bakʃ +-t	bakʃɪt	bakʃɪd	"s/he forgave"
trʊss +-t	trʊssɪt	tarsid	"s/he feared"
ʃɪnz+-t	ʃɪnzɪt	—	"it rained"
pʊrs +-t	pʊrsɪt	Porsid	"s/he asked"
rʊmm+-t	rʊmmɪt	—	"turned away, stampeded, shied"

likk+-t	likkɪt	—	"s/he wrote"
hɪʒʒ+-t	hɪʒʒɪt	—	"It blew, It rose, It raged"
gʊɖɖ+-t	gʊɖɖɪt	—	"cut off, chopped off"
sagg+-t	saggɪt	—	"s/he tolerated/ bore"
latʃtʃ+-t	latʃtʃɪt	—	"It stack, clang, adhered"
ʃarm+-t	ʃarmɪt	—	"s/he was ashamed"

With regard to table (11a & b), there is an alternation between ø~ɪ that two hypotheses are posed to determine underlying representation:

Hypothesis 1: Short high vowel [ɪ] is not in underlying representation and a rule is needed to insert it in the morpheme boundary. $ø \rightarrow ɪ / \left\{ \begin{matrix} VC_{[+cor]} \\ VCC \end{matrix} \right\} \text{—} +C_{[+cor]}\#$

Hypothesis 2: Short high vowel /ɪ/ is in underlying representation and a rule is needed to delete it in the morpheme boundary. $ɪ \rightarrow ø / \left\{ \begin{matrix} VC_{[+cor]} \\ VCC \end{matrix} \right\} \text{—} +C_{[+cor]}\#$

1- Based on SB phonotactics, two consonants with the same place of articulation (co-articulation) cannot occur in the coda. Since in table (11a), the present stem ends to a coronal consonant -by adding past maker affix [-t]- a constraint is occurred in phonotactics. Therefore, insertion the short high vowel [ɪ] is obligatory in the morpheme boundary.

2- In table (11b), the present stems which end to two consonants in the coda of the last syllable -by adding past maker affix [-t], three consonants occur in final position; therefore, this violates SB phonotactics because two consonants are utmost occurred in coda; for this reason, the short high vowel [ɪ] is inserted in the morpheme boundary.

3- Regarding "criterion of naturalness", insertion of a vowel between consonants to form syllables based on syllable structure of a language or dialect is a natural phenomenon which is seen in cross-linguistics like Standard Persian (Kambuziya, 2006: 306). With regard to the above-mentioned reasons, hypothesis (2) is confirmed and its phonological rule is as follows:

Rule (8) Insertion of short vowel[ɪ] $ø \rightarrow ɪ / \left\{ \begin{matrix} VC_{[+cor]} \\ VCC \end{matrix} \right\} \text{—} +C_{[+cor]}\#$

Rule (8) indicates that the short high vowel [ɪ] is inserted in the morpheme boundary when the first morpheme ends to a coronal consonant or a consonant cluster and the second morpheme is the past morpheme [-t].

The stems which end to coronal fricative /ʃ/ are exceptional because consonant cluster [-ʃt#] is acceptable in SB. Therefore, while adding past maker morpheme [-t] to present stem, it is not necessary to insert short high vowel [ɪ] like: /kʊʃ + -t/ → [kʊʃt] "killed".

Applying rule (8) is illustrated using the derivation of the words /ras+-t/ "arrived" and /trʊs(s)+-t/ "feared"

(8)	UR	/#ras +-t#/	/#trʊss +-t#/
	Rule (8)	rasɪt	trʊssɪt
	PR	[rasɪt]	[trʊssɪt]

7. Conclusion

In this study, the phonological processes of dissimilationand insertion were studied and analyzed in SB based on Generative Phonology, and these results have been achieved: 1. the phonological process of dissimilation often occurs between two liquids /l/ and /r/ because these two sounds belong to the same natural class. Therefore, they can substitute each other in the identical positions. 2. The process of insertion occurs both in consonants and vowels; therefore, they cause the change of syllable structure and re-syllabification. Insertion takes place in initial, medial and final positions of words. In initial position, obstruents [k] and [h]; in medial position, sonorants [r], [j] and [n]; while in final position, obstruents [k] and [d] are usually inserted. The short high vowel [ɪ] is inserted in the morpheme boundary when the first morpheme ends to a coronal consonant or a consonant cluster and the second morpheme is just a voiceless coronal stop [-t].

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