CONSONANT HARMONY IN BRAHVI CHILD PHONOLOGY

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Abstract: This study renders an Optimality Theoretic (Prince & Smolensky, 2004) analysis of words produced by a child Manahil (M) who was acquiring Brahvi as her L1 in the age of 12 to 32 months. The study focuses on the process of Consonant Harmony. This study tires to find out the segments which trigger CH in Brahvi child language and it also examines the target sounds which are harmonized. The data were collected through a diary study. The subject of this study, Manahil, had a pure monolingual setting as both her parents are native speakers of Southern (Jhalawani) Brahvi. The findings suggest that in the later stage of L1 acquisition around 15 months of her age M applies CH as a strategy to overcome her production difficulties. The child applies four types of harmony e.g. nasal, labial, coronal, lateral. Labial and nasal harmony were more dominant than lateral and coronal ones. In fact, nasal harmony appeared before other ones. In labial harmony, the segments /p/ and /b/ acted as triggers which targeted coronal and dorsal segments. In Nasal harmony /m/, /n/ spread their feature [nasal] to coronal and dorsal sounds. The direction of harmony in labial and nasal spreading was regressive only. M's productions also show lateral and coronal harmony. In the former, the segment /l/ triggers the harmony by targeting liquid /r/. And in the latter, /ʧ/ triggers the process of harmony by targeting dorsal fricatives and stops. The examples in lateral and coronal harmony show that directionality of harmony was both regressive and progressive. However, regressive harmony was more frequent than progressive harmony.

Keywords: Brahvi, Consonant Harmony, L1 acquisition, Optimality Theory

1. Introduction

Language is the most important phenomenon for a new born child because it is the basic phenomenon which apparently differentiates human beings from other species and it also plays a vital role for cognitive development of a child. First language acquisition seems to be easy for children because they seem to acquire language effortlessly and quickly, giving the impression that L1 process is straightforward and simple. But when we analyze the processes involved in child language acquisition, we come to the conclusion that children have to face many difficulties for mastering their L1.

Human children are not born with language (Clark, 2009) but they are born with innate God-gifted qualities which make it possible for them to perceive and acquire human language (Vouloumanos & Werker, 2007). Children acquire language step by step: crying, babbling etc. which are early stages appear in the early stage of acquisition. The easiest sounds are acquired and mastered before difficult ones. The segments which are easy to articulate, strong in perception, seem to be natural and normal, optimal, require less features for articulations, are considered unmarked and acquired earlier than the ones which are difficult in articulation, weak in perception, seem to be unnatural and less normal, less optimal, required more features for

articulation. To make their speech possible, children substitute the acquired segments with unacquired ones.

Consonant Harmony is a kind of substitution which is considered to be a simplification strategy helping children to deal with the task of language development. Consonant Harmony may serve to replace unacquired segments and simplify the articulation of difficult sequences and complex structures. The main purpose of this study is to record and analyze the consonant harmony process operative in the first language acquisition of Brahvi. This aim will be achieved through a thorough study of words produced by a child Manahil (M) aged 13 to 32 months, who was acquiring Brahvi[1] as her L1 at the time of observation.

Brahvi is a language mainly spoken in southern and central regions of Balochistan particularly Kalat and Quetta, and some parts of Sindh like Nawabshah and Karachi (Andronov, 1980; Bray, 1907). Besides Pakistan, Brahvi is also spoken in Iran and in Neemrooz province of Afghanistan. Brahvi has three dialects, Sarawani (Northern), Jhalawani (Southern) and Noushki. It has taken many words from its neighbouring languages as loans. The modern Brahvi has incorporated elements from Persian, Sindhi, Balochi and a number of other languages. Brahvi is the only Dravidian language spoken in Pakistan (Bray, 1907; Elfenbein, 1997). Although, Brahvi has been so Balochified, but still it has retained some of its exclusive features. The voiceless lateral /ɬ/ is the most characteristic sound of Brahvi which is not found in the neighbouring languages and even it does not occur in Proto-Dravidian languages (Subrahmanyam, 2009). It never comes in word-initial position but only occurs in post-vocal positions. But this sound is in danger as it has been observed that it is normally replaced by its clear variant /l/. (e.g. /ʈuɬ/➢ [ʈul], /xəɬ/➢ [xəl].

The current study will be conducted using OT as an analysis tool. Optimality Theory (Prince and Smolensky, 1993; 2004) has attracted the attention of linguists since its first publication from all over of the world and is considered as the heart of phonology. Recently, most studies have applied OT because OT best studies input and output relations in language acquisition (Tesar & Smolensky, 2004). OT succeeds in describing child phonology (Gnanadesikan, 2004). Since the introduction of OT researchers of L1 acquisition prefer to apply OT model as a framework in their research as it has supplanted previous models applied on child language acquisition. OT not only represents what a child during L1 acquisition has produced but it also answers why a child

[1]The word “Brahvi” is used for both the language itself and its speakers.

has not produced a particular segment/structure. It also provides the reason beyond child's failure in production. In a nutshell, OT is the most modern theory in linguistics widely used and preferred for first language acquisition.

2. Consonant Harmony

Consonant harmony (CH) is defined as assimilation of two non-adjacent consonants within a word sharing phonological feature(s).CH has been proposed to be some kind of a simplification mechanism, which helps a child handling the language acquisition task, by reducing the number of articulatory gestures (Waterson, 1978; Klein, 1981). In the process of CH, consonants share the place of articulation features. Various types of consonant harmony such as dorsal, labial, nasal, coronal, etc. are found in child language. CH does indeed target coronals and coronals also trigger CH if target are liquids (Goad, 1997). CH is a worldwide phenomenon found cross-linguistically in children. Why children harmonize words? It has been seen that in the earlier stages of acquisition children face production problems with complex structures and marked sounds. To overcome such production problems, they use the CH strategy to make their speech manageable. Some researchers think that CH is specific to child language (Johnson & Reimers, 2010). CH is a speech development error which automatically disappears from child phonology after completion of first language acquisition. The CH can be partial or full. In the former, consonants share a single feature; either place of articulation or voicing and in the latter, consonants share all features. The direction of CH can be progressive or regressive or bidirectional. In progressive CH, a consonant spreads its feature(s) to its neighbouring right consonant and it is reverse in regressive CH.

The source of difficulty has been studied from two perspectives: a specific phonological/phonetic perspective and a general data processing perspective. Vihman (1978) and Berg (1992) propose that CH may stem from a segmental source, i.e. that it is used for substituting consonants the child has not mastered yet. Children replace unacquired segments with the acquired ones. While many other studies suggest that CH occurs due to phonotactic demands that the child generally prefers harmonic over disharmonic productions or avoids the co-occurrence of certain feature sequences (Menn. 1983; Donahue, 1986; Bernhardt and Stemberger, 1998; Vihman and Croft 2007, Gerlach 2010, Becker and Tessier 2011). CH may be related to the development of prosody, where it simplifies the articulation to help the child focus on new prosodic positions or deal with long words (Keren-Portnoy et al. 2009).

Various types of CH have been reported cross-linguistically in children. In dorsal harmony, the dorsal sounds spread their PoA feature [DOR] to other non-adjacent consonants. In dorsal harmony, coronal and labial sounds anticipate the place feature of dorsal (Ingram, 1974). Directionality of harmony may be regressive or progressive. Regressive assimilation is much more common than progressive (Menn, 1971; Smith, 1973; Cruttenden, 1978; Vihman, 1978; Bernhardt & Stemberger, 1998; Goad, 2001; Webb, 1982; Jun, 1995; de Lacy, 2002). But Macken and Ferguson (1983) presented the data of a Spanish child named Si which show progressive CH. The data of a Spanish child named Si which shows progressive CH. Regressive dorsal CH can be explained through the following examples.

(1)

	Target	**Child output**
(i)	/dog/	[gɔk]
(ii)	/duck/	[gək]
(iii)	/dig/	[gik]
(iv)	/talk/	[kɔk]
(v)	/take/	[kek]

(Ingram, 1974)

We see in (1) that the coronal segments are targeted by dorsals. All coronal sounds lose their place [COR] feature and agree to receive [DOR] feature. All words in (13) have the structure of C1VC2. What is going on is that C1 consonants in each word copy the PoA features of C2 consonants in child form. All dorsal segments replace the coronals. We can say that coronals lose their PoA feature and receive the PoA feature of dorsal sounds. Directionality of harmony in (14) is regressive, i.e. right -to- left. In the cases of regressive harmony, the coronal sounds anticipate the PoA of final dorsal

In labial harmony, labial sounds spread their PoA feature [LAB] to coronal and dorsal segments. Rose (2000) presents data regarding harmony by Clara. In her production, dorsals are most likely targets and labials are the most likely triggers in labial harmony. Labial and coronal harmony is found before dorsal harmony as the former segments are acquired earlier than the latter ones. The hierarchy of harmony is sometimes changed within a language because all children do not follow the same pattern or strategy. The following examples of labial harmony illustrate this.

(2)

	Target	**Child output**
(i)	/sleep/	[wip]
(ii)	/stop/	[bɒp]
(iii)	/table/	[bebu]
(iv)	/knife/	[maip]

(Smith, 1973)

What is going on in (2) is that coronals are being targeted by labials and the direction of harmony is regressive. Regressive harmony is more frequent and common than progressive in child phonology. The above tokens show that coronal is the most likely target and labial the most likely trigger. It is cross-linguistically found that coronals are targeted by dorsal and labial sounds (Johnson & Reimers, 2014, p.32). It has been observed that dorsals and labials both act as triggers in English child phonology. Coronal sounds never act as a trigger and labials do not target dorsal in English child phonology (ibid). Therefore, Rose (2000) suggested the following hierarchy of CH for place of articulation on the basis of data collected from Amahl and Trevor.

dorsal > labial > coronal

The CH hierarchy of English children is very different from the children acquiring other languages. The data collected from Clara (Rose, 2000), a Canadian French child, presents the following CH hierarchy which is different from that of English acquiring children (Johnson & Reimers, 2010: 34).

labial > coronal > dorsal

The CH hierarchy of English children is very different from the children acquiring many other languages. According to Johnson & Reimers (2010, p. 36) Dutch, German and Jordanian Arabic have the following hierarchy in CH which is also different from that of English acquiring children.

labial > coronal > dorsal

Daana (2009), Levelt (1994) and Berg (1992) have provided data of Farah acquiring Jordanian Arabic, Robin acquiring Dutch and Melanie acquiring German. All these children prefer to retain labials. They target either coronal or dorsal segments. The following CH hierarchy is suggested for these languages by Johnson & Reimers (2010, p. 36).

labial > coronal > dorsal

Nasal harmony is also very common in children (Menn, 1971). In the process of nasal harmony, the nasal sounds like [m, n] spread feature [nasal] to other non-nasal segments to harmonize.. In the process of nasal harmony, the nasal sounds like [m, n] spread feature [NASAL] to other non-nasal segments to harmonize them. The following data exhibit nasal harmony.

(3)

	Target	**Child output**
(i)	/broom/	[mum]
(ii)	/stone/	[non]
(iii)	/plum/	[mʌm]
(iv)	/stand/	[næn]
(v)	/down/	[næʊn]

(Menn, 1971)

What is going on in (3) is that nasal sounds spread their feature [NASAL] to other segments of the same word. One thing should be noted that in the above examples labial and coronal segments are targets of nasal harmony. The direction of nasal harmony is regressive.

In the process of Lateral harmony lateral segments spread their feature [LATERAL] to other segments. In the process of Lateral harmony, we find not only coronal obstruents and nasals targeted but approximants are also targeted by labials and dorsals. The following data of Amahl acquiring English show lateral harmony.

(4)

	Target	**Child output**
(i)	/lorry/	[lɒlli]
(ii)	/really/	[lili]
(iii)	/usually/	[luli]

(iv) /lorry/ [læli]

(vi) /rolling/ [lolin]

(Smith, 1973)

We can see that approximants are targeted by the lateral. Approximants are not the only target of lateral harmony. It has been seen that non-laterals also have been targeted for lateral harmony i.e. /ceiling/ → [liling], /shallow/ → [lælo] and /shilling/ → [lilinŋ]. Ahmal (Smith, 1973) shows the same process of Lateral harmony.

3. Data Collection

The current study analyzes productions of the subject of this study Manahil (M) aged 13 to 32 months, who was acquiring Brahvi, a Dravidian language, as her L1. The subject had a pure monolingual setting as both her parents are native speakers of Brahvi. She was acquiring Southern (Jhalawāni) Brahvi. The research is father of the child. Both the author and the subject lived together in the same house during the study period. The researcher listened and talked to the subject almost 4 to 5 hours daily during this period. The researcher always had a diary with him in which he noted the words uttered by the subject. Most of the utterances of M were so clear that there was no need to listen them again for confirmation. However, some words produced by her were not comprehensible so the subject was stimulated to produce them again. After confirmation of the outputs, the researcher wrote the data. Four types of CH, namely, labial, nasal, lateral and coronal occurred in her speech which are discussed and analyzed in the following section using Optimality Theory.

4. Presentation and Data Analysis

Consonant harmony (CH) is a common phenomenon found cross-linguistically in child phonology (Vihman, 1978). First language acquisition is commonly characterized by consonant harmony (Goad, 1997). M's utterances show nasal, labial, lateral and coronal harmony. The four types of harmony are discussed in different sub sections below.

4.1. Labial Harmony

The examples in (5) show that fricatives, stops and affricates are target of labial harmony. The child produces labials instead of other sounds. To use one articulator for production of sequence

of sounds is easier and unmarked than to use more articulators. The following examples show labial harmony[2].

(5)

	Input	**Output**	**Meaning**
(i)	/ze.ba/	[be.ba]	‘beautiful’
(ii)	/top/	[pop]	‘cap’
(iii)	/ik.ba:l/	[ib.ba:l]	‘a name’
(iv)	/ʧa:p.pe	[pa:p.pe]	‘clapping’
(v)	/ʧa.bi:/	[ba.bi:]	‘key’
(vi)	/xə.ra:.be/	[ba:.be]	‘It is bad.
(vii)	/xə.ra:b/	[ba:b]	‘bad’
(viii)	/ʧe.fə/	[be.pə]	‘down’
(ix)	/ʧeif/	[beip]	‘down’
(x)	/ki.t̪a:b/	[bi.t̪a:b]	‘book’
(xi)	/kul.fi:/	[ʊp.pi:]	‘ice-cream’
(xii)	/kop/	[pop]	‘cup’
(xiii)	/kʌm.bəl/	[ʌb.bəl]	‘blanket’
(xiv)	/sa.bo:n/	[ba.bo:n]	‘soup’
(xv)	/da:l.si.wi:/	[la:l.bi:.bi:]	‘an edible thing’
(xvi)	/xa.t̪ʌm/	[pa.t̪ʌm]	‘finished’

It is regressive harmony and all targets except two are obstruent consonants. We can summarize the labial harmony process of the above data below.

(6)

	Direction	**Domain**	**Trigger**	**Target**
(i)	regressive	syllable	b	z
(ii)	regressive	word	p	t̪
(iii)	regressive	syllable	b	k
(iv)	regressive	word	p	ʧ
(v)	regressive	syllable	b	ʧ

[2]Labial harmony appeared in Manahil’s grammar at the age of 18 months.

(vi)	regressive	syllable	b	r
(vii)	regressive	syllable	b	r
(viii)	regressive	syllable	b	ʧ
(ix)	regressive	syllable	b	ʧ
(x)	regressive	word	b	k
(xi)	regressive	syllable	p	l
(xii)	regressive	word	p	k
(xiii)	regressive	syllable	b	m
(xiv)	regressive	syllable	b	s
(xv)	regressive	syllable	b	s
(xvi)	regressive	syllable	p	x

The summary of labial harmony in (6) shows that coronals and dorsals are being targeted by labials and the direction of harmony is regressive. Regressive harmony is more frequent and common than progressive in child phonology (Cruttenden, 1978; Vihman, 1978) because regressive harmony is anticipatory; the child perceives the presence of labial in advance. The above tokens show that coronal is the most likely target and labial the most likely trigger. It is cross-linguistically found that coronals are targeted by dorsal and labial sounds in such spreading (Johnson & Reimers, 2014: 32). Dorsal and labial both act as triggers in English child phonology (ibid). Coronal sounds rarely act as a trigger and labials do not target dorsals in English child phonology. M's data show that dorsals are targeted by labials. The tokens in (iii, x, xii, xvi) show that labial sounds are spreading their feature [LAB] regressively to dorsals. The domain of harmony is not limited to only syllable boundary. It reaches its targets across syllable boundary. In some examples, the feature labial spreads within the syllable and in others it spreads across the syllable boundary.

In the above examples, labials target obstruents and sonorants. The case of change of /*kʌm.bəl*/ into [ab.bəl] is the only example of its type, so for a moment it is neglected as an exception. Although, /m/ has feature [LAB] due to which dorsal /x/ in (xvi) becomes the target of labial harmony. We find not only the coronal obstruents and dorsals targeted by labial but approximants are also targeted by labials. The words in (vi, vii and xi) show that /r/ and /l/ are also targeted by labials. The same words in (vi and vii) are disyllabic and tri-syllabic but the first syllable is deleted first and then the process of harmony starts. In other words, the input in (vi)

changes from tri-syllabic word to disyllabic and in (vii) it becomes monosyllabic after deletion of first syllable. The child deletes the unstressed syllables because in the early stage of L1 acquisition children cannot perceive them.

The example (xv) is very interesting due to the occurrence of both lateral and labial harmony simultaneously. Both show regressive harmony. /l/ targets alveolar coronal /d̪/ for lateral harmony and in the process of labial harmony /b/ targets coronal /s/. In both, labial and lateral harmony the targets are coronals.

The triggers determine direction of spreading of consonant harmony. Examples are also found in the world literature (Fikkert, 1994; Kappa, 2001; Menn, 1971; Smith, 2010; Rose, 2000). In world literature, velars are found to be the most frequent triggers of consonant harmony (Johnson & Reimers, 2010). The literature also shows some data of world languages where labials target dorsals. Melanie (Berg, 1992) and Farah (Daana, 2009), who were acquiring German and Jordanian Arabic respectively, illustrate that dorsals are targeted by labials. In the current study, we also see dorsals are targeted by labials. In the following lines, we explain the process of labial harmony using Optimality Theory language. The relevant constraint which triggers harmony is defined below.

$SPREAD_{[LAB]}$ /L-PrWd: The feature labial spreads regressively to other consonants in the domain of a prosodic word.

Tableau 1: Labial harmony in consonants

/t̪op/	$SPREAD_{[LAB]}$ / L-PrWd	$IDENT\text{-}IO_{[F]}$
a. t̪op	*!	
☞b. pop		*

The candidate (a) which is faithful to the input is rejected on account of violation of $SPREAD_{[LAB]}$ which is higher ranked. Thus, the candidate (b) emerges as a winner because it satisfies the highly ranked constraint $SPREAD_{[LAB]}$ but violates only $IDENT\text{-}IO_{[F]}$ which is lower ranked.

The available data show that not a single token shows progressive labial harmony which indicates that M's grammar prefers regressive harmony.

4.2. Nasal Harmony

Nasal harmony is also common phenomenon found cross-linguistically in the child phonology. The following examples show that nasal harmony[3] is operative in Manahil's grammar.

(7)

	Input	**Output**	**Meaning**
(i)	/ga.na/	[na.na]	'song'
(ii)	/ka.na/	[na.na]	'(we) go.
(iii)	/ka:n/	[na:n]	'let's move'
(iv)	/ʧa:m.me/	[me:.me]	'it is night'
(v)	/bi:m.me/	[mi:m.me]	'a cartoon'
(vi)	/ha.mi:/	[ma.mi:]	'a name'
(vii)	/ɖo.no/	[no.no]	'like this'
(viii)	/ha.ni:/	[na.ni:]	'a name'
(ix)	/kon/	[non]	'cone'
(x)	/ka:m.bo/	[ma:m.bo]	'let's go'
(xi)	/kan.go/	[nan.ɖo]	'a game'
(xii)	/ha.mi:/	[ma.mi:]	'a name'
(xiii)	/ʧa:m.na/	[ma:.ma]	'at night'
(xiv)	/li:m.bo/	[mi:m.bo]	'lemon'
(xv)	/ɘn.go:.man/	[ɘn.no:.man]	'honey'
(xvi)	/pi:.ma:z/	[mi:.ma:z]	'onion'
(xvii)	/ja:m/	[ma:m]	'guava'

We can summarize the nasal harmony process of the above data in (8) below.

(8)

Direction	**Domain**	**Trigger**	**Target**

[3] Nasal harmony appeared before labial, lateral and coronal harmony and was seen in M's production at 15 months of age.

(i)	regressive	syllable	n	g
(ii)	regressive	syllable	n	k
(iii)	regressive	word	n	k
(iv)	regressive	syllable	m	b
(v)	regressive	syllable	m	h
(vi)	regressive	syllable	n	d̪
(vii)	regressive	syllable	n	h
(viii)	regressive	word	n	k
(ix)	regressive	word	m	b
(x)	regressive	word	m	k
(xi)	regressive	syllable	m	h
(xii)	regressive	syllable	m	ʃ
(xiii)	regressive	syllable	m	l
(xiv)	progressive	syllable	n	g
(xv)	regressive	syllable	m	p
(xvi)	regressive	syllable	m	ʤ

The data in (7) and (8) show that the domain of nasal harmony is not limited to monosyllabic words but it reaches to polysyllabic words as well. The direction of harmony is regressive in all words as regressive harmony is more common and frequent in child phonology than progressive (Bernhardt and Stemberger, 1998; Cruttenden, 1978; de Lacy, 2002; Goad, 2001; Menn, 1971; 1995; Smith, 1973; Vihman, 1978; Webb, 1982).

We can see that nasals [n, m] act as triggers which spread their feature [nasal] to coronal (iv, vii, xiii & xvii), labial (v, x & vi) and dorsal (i, ii, iii, ix & xv) sounds. In world literature, we find examples of nasal harmony. Daniel (Menn, 1971) provides examples of nasal harmony in which coronal and labials are targeted by nasals. There is only one example (xiv) which illustrates that liquid [l] is targeted by nasal [m]. It is noticeable that dorsals are targets of harmony more frequently than coronal and labial segments. We apply Optimality Theory to analyze the data. The relevant constraint which triggers harmony is defined below.

$SPREAD_{[NAS]}$ /L-Pr-Wd: The feature nasal spreads regressively to the other consonants in the domain of a prosodic word.

Tableau 2: Nasal harmony in consonants

/ka:n/	SPREAD $_{[nasal]}$ / L-Pr-Wd	IDENT-IO$_{[F]}$
a. ka:n	*!	
☞b. na:n		*

The candidate (a) is rejected on account of violation of highly ranked constraint SPREAD$_{[nasal]}$. The candidate (b) is declared as winner because it satisfies the higher ranked constraint but incurs only one violation of lower ranked constraint IDENT-IO$_{[F].}$ The nasal harmony in M's productions illustrates that the process of harmony reaches beyond the syllable boundary.

In the process of nasal harmony, we saw that the nasals /m, n/ acted as triggers. No single token illustrated that dorsal nasal /ŋ/[4] acted as a trigger because the child has not acquired dorsal segments. Thus, it confirms M follows the universal pattern of L1 acquisition in which labial and coronal nasals are acquired before the dorsal ones. All examples show regressive harmony which indicates that M prefers regressive harmony than progressive one. We have already seen in the process of labial harmony that the child preferred regressive harmony.

4.3. Coronal Harmony

The coronal harmony is not as common as labial, nasal, lateral and dorsal harmony because coronals are the most unmarked segments. Replacement of coronal fricatives with coronal stops is a process of substitution not consonant harmony because coronals are the most unmarked sounds. But affricates in comparison with fricatives seem to be more marked relative to other coronals as the former has two phases in production that is stop + fricative. On account of this, we can claim that the substitution of other segments with affricate /ʧ/ is coronal harmony. The following data show the process of coronal harmony[5].

(9)

	Input	**Output**	**Meaning**
(i)	/xɔ.ʧa.ne/	[ʧɔ.ʧa.ne]	'sleeping'

[4]M could not produce dorsal /ŋ/ even at the age of 32 months.

[5]Coronal harmony appeared late in Manahil's grammar at the age of 22 months of age.

(ii)	/ʧa.ko:/	[ʧa.ʧo:]	‘knife’
(iii)	/ʧɔk.ka/	[ʧɔʧ.ʧa]	‘a six’
(iv)	/xʌs.sa:ʈ.ʈɔ/	[ʧʌʧ.ʧa:ʈ.ʈɔ]	‘I threw it
(v)	/xa:ʧ/	[ʧa:ʧ]	‘sleep’
(vi)	/xa:.ʧe.wa/	[ʧa.ʧe.wa]	‘I sleep’
(vii)	/xʌʧ/	[ʧʌʧ]	‘dirt’
(viii)	/xʌʧ.ʧi:/	[ʧʌʧ.ʧi:]	‘dirty’

We can summarize the coronal harmony process of the above data in (10) below.

(10)

	Direction	**Domain**	**Trigger**	**Target**
(i)	regressive	syllable	ʧ	x
(ii)	progressive	syllable	ʧ	k
(iii)	progressive	syllable	ʧ	k
(iv)	regressive	syllable	ʧ	x
(v)	regressive	word	ʧ	x
(vi)	regressive	syllable	ʧ	x
(vii)	regressive	word	ʧ	x
(viii)	regressive	syllable	ʧ	x

The data in (9) and (10) show that all velar sounds are target of coronal harmony and the trigger is affricate [ʧ]. The direction of harmony is both regressive and progressive but regressive harmony is found more than regressive which shows that M prefers regressive harmony. The case of coronal harmony is presented in the following tableau. The relevant constraint is defined below.

SPREAD$_{[COR]}$ /Pr-Wd: The feature coronal spreads to the other consonants in the domain of a prosodic word.

Tableau 3: Coronal harmony in consonants

/xa:ʧ/	SPREAD $_{[COR]}$ / Pr-Wd	IDENT-IO$_{[F]}$

a. xa:ʧ	*!	
☞ b. ʧa:ʧ		*

The candidate (a) is rejected on account of violation of highly ranked constraint $SPREAD_{[COR]}$. The candidate (b) is declared as winner because it satisfies the higher ranked constraint and incurs only one violation of lower ranked constraint $IDENT\text{-}IO_{[F]}$.M's productions show that process of Coronal harmony reaches beyond the syllable boundary.

There are two affricates /ʧ, ʤ/ in Brahvi. It should be kept in mind that the latter was acquired before the former which is opposite to the universal pattern of L1 acquisition in which voiced consonants are acquired after voiceless ones. M does not use /ʤ/ as a trigger for harmony. The question arises that why she only uses the voiceless affricate to harmonize other segments. For my understanding, it is easy for the child to use a voiceless affricate as a trigger when the targets are also voiceless segments. We see that all targets are voiceless sounds which are dorsal fricatives or stops only.

4.4. Lateral Harmony

Lateral harmony is also found in child language phonology cross-linguistically. Amahl (Smith, 1973) shows the process of lateral harmony in which the targets are only approximants. The following data illustrate that lateral harmony is operative in M's productions.

(11)

	Input	**Output**	**Meaning**
(i)	/reil/	[leil]	'train'
(ii)	/ril.li:/	[lil.li:]	'cloth sheet'
(iii)	/ei.la:r/	[ei.la:l]	'dates' (fruit)
(iv)	/il.la.re/	[il.la.le]	'did you keep'
(v)	/xo.li:.rə/	[t̪o.li:.lə]	'they get afraid'
(vi)	/bo.lə.ɽi:/	[/bo.lə.li:]	'monkey'

The process of Lateral harmony is summarized below in.

(12)

	Direction	**Domain**	**Trigger**	**Target**
(i)	regressive	word	l	r

(ii)	regressive	syllable	l	r
(iii)	progressive	syllable	l	r
(iv)	progressive	word	l	r
(v)	progressive	word	l	r

The above data in (12) show that the process of lateral harmony found in the grammar of the child is beyond syllabic boundaries. The lateral /l/is the only trigger which targets liquid /r/. The process of lateral harmony is presented in the following tableau. The relevant constraint is defined first.

SPREAD$_{[LAT]}$ /Pr-Wd: The feature lateral spreads regressively to the other consonants in the domain of a prosodic word.

Tableau 4: Lateral harmony in consonants

/reil/	SPREAD $_{[LAT]}$ / Pr-Wd	IDENT-IO$_{[F]}$
a. reil	*!	
☞b. leil		*

The candidate (a) fails to emerge as winner on account of violation of SPREAD $_{[LAT]}$ /Pr-Wd which is a higher ranked constraint. On other hand, the candidate (b) only incurs a violation of IDENT-IO$_{[F]}$ which is lower ranked. Thus, the candidate (b) emerges optimal.

5. Summary

The main objective of this attempt was to study Consonant Harmony process in Manahil's acquisition of consonants of Brahvi as L1. We saw that CH was operative in the grammar of M. Labial and nasal harmony were more active than lateral and coronal ones. In labial harmony, the segments /p, b/ acted as triggers which targeted coronals and dorsals. In nasal harmony, /m, n/ sounds spread their feature [nasal] to coronal and dorsal sounds. The direction of harmony in labial and nasal spreading was regressive only. M's productions also show the process of lateral and coronal harmony. In the former the segment /l/ triggers the harmony by targeting liquid /r/, and in the latter, /ʧ/ triggers the process of harmony by targeting dorsal fricatives and stops. The examples in lateral and coronal harmony show that directionality of harmony was both regressive and progressive. However, regressive harmony was more frequent than progressive.

We could not observe dorsal harmony in M's data. This leaves room for further research whether other children of Brahvi also follow the same strategy applied by M or they use dorsal harmony in their speech. This can be confirmed by conducting more studies on Brahvi children. The segments /p,b,m,n,l,ʧ/ acted as triggers and /ʈ,ɖ,s,z,ʤ,k,g,h,,x, r/ were targets in M's productions. We can develop the following hierarchy of CH for place of articulation after analyzing the data of Manahil.

Labial > Coronal > Dorsal

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