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Phonological Processes in Yemeni Arabic: A Case Study of Amrani Yemeni Arabic

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Abstract

Amrani Yemeni Arabic is a dialect of Yemeni- Modern standard Arabic(Y-MSA). It is a spoken and non-literary variety and is spoken in the city of Amran and some other districts in Amran governorate. Amrani Yemeni Arabic is used in social contexts while Modern Standard Arabic (MSA) is used as the official language used in institutions, literature, social media and press.

This research aims to investigate the phonological processes exhibited in the speech of Amrani Yemeni Arabic (AYA) speaking child. A single case study design using a three year old child was conducted to note the development of phonological system of her mother tongue and what phonological processes were involved if any. The data was collected using spontaneous speech.

The results of the current study showed that some phonemes were acquired while some were in the process. Most often the sounds tend to appear firstly in word-initial positions. They also showed that the child was using simplified forms commonly for the uvulars /χ/ and /ʁ/ and the trill /r/ being substituted with /ħ/, /ʕ/ and /l/ respectively. Though there were some universal phenomenon regarding language acquisition, the findings showed that the stages and sequence of phonemic acquisition were to a large extent child-specific.

Key words: Amrani Yemeni Arabic, phonological processes

1. Introduction

The acquisition of language "is doubtless the greatest intellectual feat any one of us is ever required to perform." (Bloomfield, 1933).

Broadly speaking, the acquisition of language is the spontaneous, unconscious, uncontrolled and unmanaged process whereby a child acquires his mother-tongue, it is usually referred to as first language acquisition. Language acquisition involves the development of child language and is divided into a number of stages that are defined chronologically which may more or less differ from one language to another. Therefore, language acquisition is a universal property of all languages, in the sense that each and every language is acquired by its native speakers, but the order of acquisition may differ to some extent.

2. Phonological development

Phonological development is one if not the major part of language acquisition. It goes through different stages that may vary cross-linguistically.

Dodd et al. (2003) reported that phonological development occurs in terms of acquisition of two aspects; phonetic acquisition and phonemic acquisition. The term 'phonetic' refers to speech sound production (articulatory/ motor skills). The term 'phonemic' refers to speech sound use (functions/ behavior/ organization of the speech sound system). They elaborated that the former is used to refer to the acquisition of sounds whereas the latter is used to refer to the age at which the phonological errors or processes patterns were suppressed.

Jackobson (1964) postulated that a schwa /ə/ is the earliest vowel to emerge, and generally a labial as the first consonant in the speech of a child. His predictions embraced the following:-

a. Stops are acquired before nasals, with fricatives next and liquids late;
b. Voiceless consonants are acquired before voiced ones;
c. Front consonants are acquired before back ones.

Ferguson and Farwell (1975) and Cruttenden (1978) supported Jakobson's predictions and proposed a strength scale, labials > apicals > velars.

Dodd et al (2003) compared works done by Wellman et al. (1931), poole (1934), Templin (1957), Olmsted (1971), Prather et al. (1975) and Smit (1990) to document the acquisition of

phonemes of English language. The table below gives comparison of phonemes acquisition of 6 different studies

Table 1: Comparison of studies on phonological acquisition in English

	Wellman (1931)	Poole (1934)	Templin (1957)	Olmsted (1971)	Prather (1975)	Smit (1990)
Subject no	204	65	480	100	147	997
Age range	2.0-6.0	2.6-8.6	3.0-8.0	2.6-8.6	2.6-8.6	2.6-8.6
Area	Iowa	Michigan	N/A	N/A	Scattle	Iowa/Nebraska
Speech mode	S and I	S and I	S and I	S and I	S and I	S and I
% age group	I, M, F	I, M, F	I, M, F	I, M, F	I, M, F	I, M, F
Acquired first	75%	100%	75%	50%	75%	N/A
Acquired last	m, n, b, f, w, h	m, p, b, w, h	m, n, ŋ, p, f, w, b	-	m, n, ŋ, p, h	m, n, p, b, d, w
	ŋ, θ, ð, ʒ, d ʒ	θ, s, z, ɹ	ð, z, ʒ, dʒ	ŋ,ð, ʒ, tʒ, dʒ	v, θ, z,dʒ	ŋ, s, z, ɹ
/m/	3	3:6	3	<4	2	3
/n/	3	4:6	3	<4	2	3:6 f, 3 m
	>6	4:6	3	>4	2	7-9
/p/	4	3:6	3	<4	2	3
/b/	3	3:6	4	<4	2.8	3
/t/	5	4:6	6	<4 I, F >4	2.8	4:6 f, 3:6m
/d/	5	4:6	4	<4	2.4	3f, 3.6
/k/	4	4:6	4	<4	2.4	3:6
/g/	4	4:6	4	<4	3	3:6f, 4m
/f/	3	5:6	3	<4	2:4	I: 3:6 : F: 5:6
/v/	5	6:6	6	<4	> 4	5:6

/θ/	>6	7:6	6	<4 M, F, >4 I	> 4	6f, 8m
/ð/	6	6:6	7	>4	4	4:6f :7m
/s/	5	7:6	4:6	>4	3	7-9
/z/	5	7:6	7	<4 M, F, >4 I	> 4	7-9
/ʃ/	No info	6:6	4:6	<4	3:8	6f, 7m
/ʒ/	6	6:6	7	>4	4	No info
/tʒ/	5	No info	4:6	<4 F: >4 I, M	3:8	6f, 7m
/dʒ/	6	No info	7	<4 M: >4 I, F	> 4	6f, 7m
/l/	4	6:6	6	<4 I: >4 M, F	3:4	I:5f,6m: F:6f, 7m
/ɹ/	5	7:6	4	< 4	3:4	8
/w/	3	3:6	3	< 4	2:8	3
/j/	4	4:6	3:6	No info	2:4	4f, 5m
/h/	3	3:6	3	No info	2	No info

(This table has been cited from Phonological development: normative study of British English-speaking children, Dodd et al., 2003).

In their series of studies, Amyreh and Dyson compared between the results of their own studies and English. They also specified the age groups participants' acquisition of their mother tongue. They compared the acquisition of Arabic consonants to that of English along with studies conducted by Smit et al (1990), Prather et al (1975) and Templin (1957). Only 18 consonants were compared were existing in both languages. In the study they compared the acquisition ages between Arabic and English and also between standard Arabic and acceptable variety. They also noted that gender is a distinguishing factor in the acquisition of Arabic consonants where girls acquire the phonemes earlier than boys. Their study is summarized in the table below as Table-2

where comparison between acquisition ages of consonants in Arabic (acquisition = 75% correct in all positions tested) and in three studies of English.

Table 2: comparison between acquisition of consonants in Arabic and English

	Arabic		English		
Sound	**Standard**	**Acceptable**	**Smit et al., 1990**	**Prather et al., 1975**	**Templin, 1957**
/b/	3:0-3:4	3:0-3:4	≤3:0, ≤3:0	2:8	4:0
/t/	2:6-2:10	2:6-2:10	≤3:0, ≤3:0	2:8	6:0
/d/	3:0-3:4	3:0-3:4	≤3:0, ≤3:0	2:4	4:0
/k/	2:6-2:10	2:6-2:10	≤3:0, ≤3:0	2:4	4:0
/f/	2:6-2:10	2:6-2:10	≤3:0, ≤3:6	2:4	4:0
/θ/	>6:0-6:4	5:0-5:4	5:6, 6:0	>4:0	6:0
/ð/	>6:0-6:4	>6:0-6:4	4:0, 5:6	4:0	6:0
/s/	5:0-5:4	5:0-5:4	3:0, 5:0	3:0	4:6
/z/	>6:0-6:4	>6:0-6:4	5:0, 6:0	>4:0	7:0
/ʃ/	5:0-5:4	5:0-5:4	4:0, 5:0	3:8	4:6
/dʒ/	>6:0-6:4	4:0-4:4	4:6, 4:0	>4:0	7:0
/h/	5:0-5:4	5:0-5:4	≤3:0, ≤3:0	2:0	≤3:0
/m/	≤2:0-2:4	≤2:0-2:4	≤3:0, ≤3:0	2:0	≤3:0
/n/	2:6-2:10	2:6-2:10	≤3:0, ≤3:0	2:0	≤3:0
/l/	3:6-3:10	3:6-3:10	4:6, 6:0	3:4	6:0
/r/	5:6-5:10	5:6-5:10	6:0, 5:6	3:4	4:0
/w/	2:6-2:10	2:6-2:10	≤3:0, ≤3:0	2:8	≤3:0
/j/	6:0-6:4	2:6-2:10	3:6, 3:6	2:4	3:6

Ages of girls, then boys

Sounds tested only in two positions with percentages for two positions averaged

(Cited from The acquisition of Arabic consonants, Amayreh & Dyson,1998).

In summary, it can be said from the above two tables that Arabic children acquire the phonemes faster than the English speaking children. Also in some instances especially the semi-vowels, the English children acquired them earlier than Arabic.

3. Phonological Processes

During the process of phonological development the child undergoes certain modifications of the phoneme production which are known as phonological processes. According to Stampe (1979) a phonological process is "a mental operation that applies in speech to substitute for a class of sounds or sound sequences presenting a common difficulty to the speech capacity of the individual, with an alternative class identical but lacking the difficult property". While Steol-Gammon and Dunn (1985) define phonological processes as the systemic errors that children produce to simplify the phonological system of adults. Williamson (2008) noted that phonological processes are simplifications that are not random but predictable. There are three major types of phonological processes (Ingram, 1989; Stampe, 1973) that have been noted: substitution processes, assimilation and syllable structure processes.

3.1 Phonological Processes in English and Other Languages

Ingram (1974) proposed that phonological processes can operate in different forms in the process of language acquisition. He summarized with the help of examples that the most commonly occurring ones were consonant-cluster reduction and weak-syllable deletion. He refuted the notion that Phonological processes fundamentally consist of substitution. He concluded that identifying general rules can ultimately lead to variations of strategies among children in the process.

Zhu Hua and Dodd (2000) investigated the phonological acquisition of 129 monolingual Putongham-speaking children (age range 1:00 – 4:6 year-olds). They said that the syllable of the language they investigated had four elements tone, syllable initial consonant, vowel and syllable final consonant. Phonological processes identified in Putonghua-speaking children were common, two of which; syllable-initial deletion while backing would be regarded as odd and atypical in English. Other processes found in the speech of Putonghua-speaking children are simplification

assimilation, initial consonant deletion, fronting, fronting, backing, X-verbalization, stopping, affrication & valorization.

Joshi (2002) conducted a comparative study on the phonological acquisition in Hindi languages speaking children. The data samples were collected from 5 children ranging between 2;0 – 3;10 years three of them were girls. He noted that phonological processes attested in standard Hindi were assimilations, substitutions; fronting, backing, stopping, lateralization etc., homonymy, metathesis, prosthesis, epenthesis, gemination, degemination, etc. Substitution processes recorded the massive occurrence and amongst substitution fronting scored the highest.

Therefore, it was observed that the phonological processes occur in the acquisition of all languages regardless of their order and frequency. One phonological process may be prominent in one or more languages but not in some others.

3.2 Phonological Processes in Arabic

As far as the phonological processes in Arabic are concerned, a few studies were reported. Ammar and Morsi (2006), Shahin et al. (2012) and Al-buainain et al. (2012) accounted for phonological processes in terms of linguistic levels.

Ammar and Morsi (2006) identified errors that are exercised by children acquiring Cairene Egyptian Arabic (CEA). They noted that the processes involved were r-deviation, sibilant fronting, devoicing, de-emphasisation, velar fronting, di-and poly-syllabic words simplification and cluster simplification. These errors are found to occur less frequently in normally developing children than in the speech of phonologically disordered children. Compared to normally developing children, it is reported that phonologically disordered children show more restrictions on the number of speech sounds.

In the Tazzi dialect of Yemeni Arabic, Al-Bothigi (2012) discussed the acquisition of prosodic structure by Tazzi-speaking children. She also shed some light on the acquisition of segmental aspects of language acquisition. She examined the phonological acquisition in 12

children taking two of them for a longitudinal study. She explained the errors done by children in terms of phonological processes. She reported that children go through number of stages in the acquisition process saying that they acquire the phonological system in the following stages:

- Stage I: /s/, /t/, /d/ and /n/ (/l/, /z/, /sˤ/, /r/, /θ/ and /ð/ are problematic at this stage)
- Stage II: /f/, /k/, /z/ and /g/.
- Stage III: /ħ/, /ʕ/ and /ʃ/.
- Stage IV: /tˤ/ and /sˤ/.
- Stage V: /q/ only in coda position
- Stage VI: /χ/ and /ʁ/ only in coda position, /q/ fully acquired at this stage.
- "The remaining sounds (/r/, /ð/,/ðˤ/) and (/χ/, /θ/ and /ʁ/) in onset positions are acquired in later stages." she added.

In Qatari-Arabic, Al-buainain et al. (2012) noted that children go through a number of stages of phonological acquisition and said to have the same errors done by other children in any language acquisition. They explain the errors done by children in terms of phonological processes.

In Sana'ani Yemeni Arabic, Modhafar (2013) investigated the phonological processes that occurred in the speech of a 4 year old child. Data samples were collected in five different sessions, which he considers as stages. Results showed that there are two types of phonological processes viz. systemic simplification and structural simplification. It was reported that systemic processes were much higher in occurrence than structural processes. Among systemic processes substitutions are the highest while sibilant deviation /s/ → /θ/ scored the highest followed by fronting among substitutions.

It can be summarized that, as in English and many other languages, Arabic children go through different stages in the process of phonological acquisition and they exhibit some errors.

4. Methodology

The participant in the present study is a normally developing three-year-old girl child. The materials used were recordings of spontaneous speech. These were in different single-words, phrases and sentences. Data was collected for 3-months. All the data were digitally taken in the form of audio-visual recordings. The researcher made sure that all recordings were as spontaneous as possible. The recordings were phonetically transcribed by the researcher using IPA notations. The scoring and analysis used in the current study were adopted from *Williamson (2008,14)* classification system in which talked about two major types of processes namely Structural simplification and Systemic simplification.

5. Analysis and Discussion

Before doing the analysis, the phonemic inventory of the child was obtained from the data that were collected for the present study and it is presented in table 3 below. The first column indicates the manner of articulation & the place of articulation is indicated in the first row. The phonemes; /m/, /b/, /f/, /n/, /t/, /d/, /s/, /z/, /l/, /j/, /w/, /ħ/, /ʕ/, /ʔ/, /tˤ/ and /sˤ/ are acquired by the age of 3 years. The underlined ones; /θ/,/ð/, /ðˤ/, /r/, /ʃ/,/ʒ/,/k/,/g/,/χ/and /ʁ/are those sounds that have not been acquired and are still to appear later.

Table 3: The phonemic Inventory of the Child

Place of Articulation / Manner of Articulation		Bilabial		Labio-dental		Inter-dental		Dental-alveolar		Post-alveolar		palatal		Velar		Uvular		Pharyn-geal		Laryngeal	
		VL	V	VL	V	VL	V	VL	V	VL	V	VL	V	VL	V	VL	V	VL	V	VL	V
Stop			b					t	d					k	g						ʔ
Emphatic									tˤ												
Nasal			m						n												
Fricative					f	θ	ð	s	z	ʃ	ʒ					χ	ʁ	ħ	ʕ		h
Emphatic							ðˤ	sˤ													
Liquid	**Lateral**								l												
	Tap/Trill								r												
Glide			w										j								

From the 100 words that were analyzed, 181 occurrences of different types of phonological processes were observed. These data are represented in the following table which shows the raw scores along with the percentage of occurrence.

Table 4: Raw score and Percentage of Overall Occurrence of Processes

S. No	Major Type	Raw score	Percentage
1	Structural Simplification Processes	24	13 %
2	Systemic Simplification Processes	157	87 %

The overall occurrence of the data is represented in the form of column chart

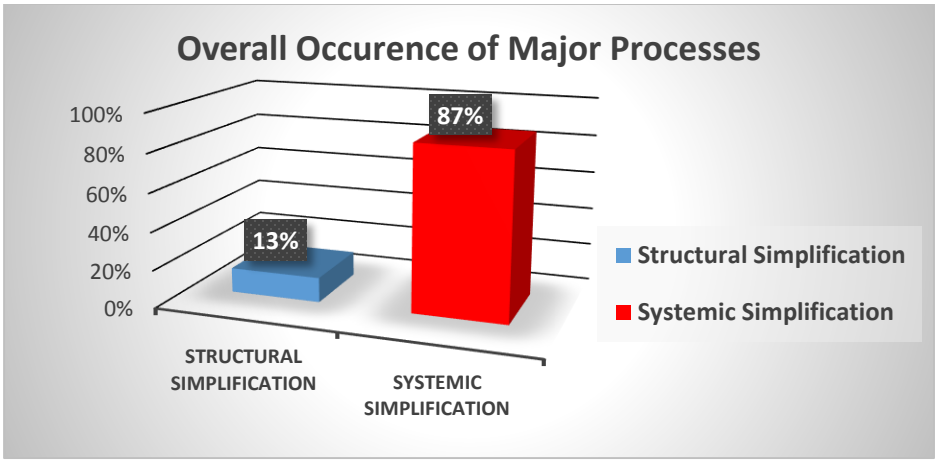

Figure 1: Percentage of overall occurrence of processes

5.1. Structural Simplifications

It is a kind of phonological processes whereby the syllabic structure of the word is simplified and made easier. It involves consonant deletion, cluster reduction, syllable deletion and Metathesis. These processes are represented in Table 5 below:

Table 5: Raw score and Percentage of occurrence of structural simplification processes

Process	Raw score	Percentage
Consonant deletion	4	17 %
Cluster reduction	4	17 %

Syllable deletion	6	25 %
Metathesis	10	41 %

The pie chart for percentage is shown graphically as Figure 2. below:

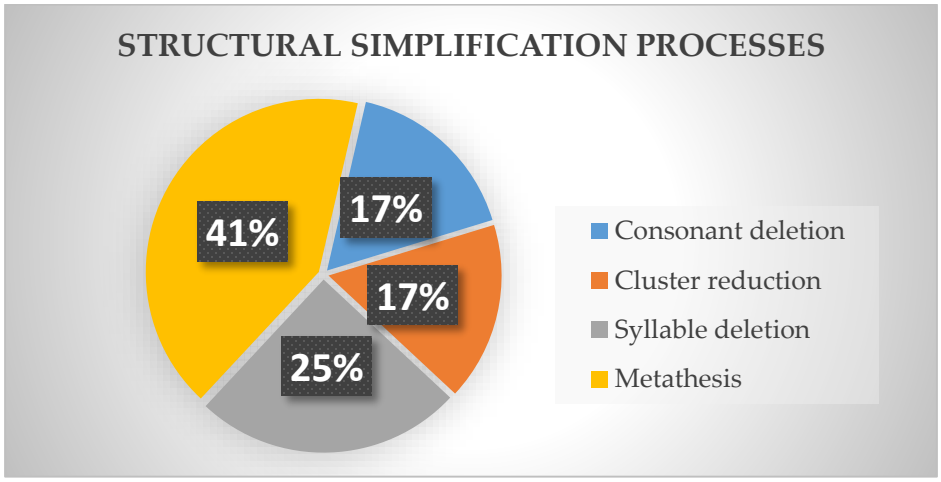

Figure 2: Percentage of occurrence of structural simplification processes

1- Consonant deletion

e.g. [sˤa:ʒ] → [sˤa:] (plate)

- Though it is less frequent in AYA but it occurs in many languages as reported by Ingram (1974), Smit (1990), Watson (1997) Ammar & Morsi (2006).

2- Cluster reduction

e.g. [mak.ta.beh] → [ma.ta.beh] (library)

- Uncommon in AYA though it is common in other Arabic varieties.

3- Syllable deletion

e.g. [iʃ.tar.ri] → [is.tal] (buy)

-usually involved the unstressed syllable.

4- Metathesis

e.g. [mal.ʕab] → [maʕ.lab] (playground)

5.2. Systemic Simplifications

These phonological processes systematically vary a particular type of speech sound and replace it with another. The two main categories are substitutions and assimilations. These processes are represented in Table 4.3 below:

Table 5: Raw score and Percentage of occurrence of Systemic simplification processes

Process		Raw score	Percentage	Overall Percentage
Substitution	Fronting	52	33 %	89 %
	Backing	24	15 %	
	Lateralization	40	26 %	
	Pharyngeal Replacement	21	13 %	
	Stopping	2	1 %	
Assimil-ation	Assimilation	15	10 %	11 %
	Vowel Harmony	3	2 %	

The pie chart for percentage is shown graphically as Figure 3. below:

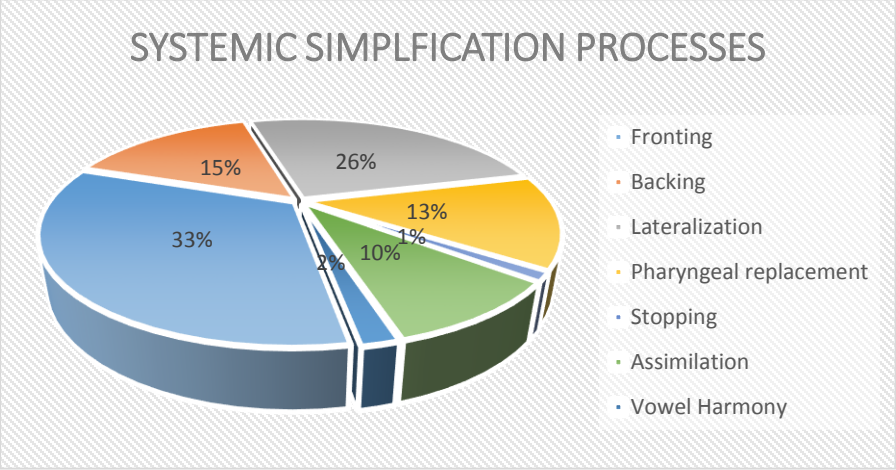

Figure 3: Percentage of occurrence of Systemic simplification processes

5.2.1. Substitution Processes

1. **Fronting**

Fronting happens not only in one sound or one place of articulation rather. It happens in various sounds and places as in:

- [k] → [t] [kor.tu:n] → [til.tu:n] ‘cartoon’
- [g] → [d] [ga.lam] → [da.lam] ‘pen’

+ cons.	→	+ cons.
- son.		- son.
- voiced		- voiced
- ant.		**+ ant.**
- cor.		**+ cor.**
+ dor.		**- dor.**

- [ʃ] → [s] [Sam.ʕah] → [sam.ʕah] ‘candle’ (palatal fronting)
- [ʒ] → [z] [Za:] → [za:] ‘he came’

+ cons.	→	+ cons.
- son.		- son.
+ voiced		+ voiced
+cont.		+cont.
- **ant**.		**+ ant.**
+ cor.		+ cor.
+ stri.		+ stri.

2. Backing

Backing was among the most common processes as the data above has shown. Although it occurs with more sounds than fronting its frequency of occurrence is less as in:

- [ð] → [z] [ðeʔb] → [zeʔb] ‘wolf'
- [θ] → [s] [θaub] → [saub] ‘garment‘

+ cons.				+ cons.
- son.				- son.
- voiced		→		- voiced
+cont.				+cont.
+ ant.				+ ant.
+ cor.				+ cor.
- stri.				**+ stri.**

- [f] → [s] [mif.ta:ħ] → [mis.ta:ħ] 'key'

+ cons.				+ cons.
- son.				- son.
- voiced		→		- voiced
+cont.				+cont.
+ ant.				+ ant.
- cor.				**+ cor.**
+ labial				**- labial**
+ stri.				+ stri.

3. Lateralization

- [r]→ [l] [riʒ.li] → [liz.li] 'my foot'

{+trill} → {+lateral}

It is said to be a universal phenomenon as stated by Amyerh and Dyson (2000), Smit (1990) and Ayyad (2011) and that is because the child is not able to control the rapid movements of the tongue nor even the simple tapping

4. Pharyngeal Replacement

- [χ] → [ħ] [χi.ja:r] → [ħi.ja:l] 'cucumber'
- [ʁ] → [ʕ] [ʁu.ra:b] → [ʕu.la:b] 'crow'

{+dorsal} → {-dorsal}

5. Stopping

- [m] → [b] [mul.zu.gi] → [bul.zu.di] 'bangle'

+ cons. **+ son.** + voiced +labial **+ nasal**	→	+ cons. **- son.** + voiced +labial **- nasal**

Stopping was the least process to occur among substitutions.

5.2.2. Assimilation Processes

1. **Assimilation**

- [k]→ [t] [kitab] → [titab] 'book'
- [ʒ] → [z] [ʒa.zar] → [za.zal] 'carrot'

Assimilation was found to occur in many instances and with many sounds. It is reflecting a phenomenon that is well attested cross-linguistically.

2. **Vowel Harmony**

- [ħi.mar] → [ħa.mal] 'donkey'
- [dab.dob] → [dob.dob] 'teddy bear'

Vowel harmony was found to occur less than assimilation. As we can see from the data collected, vowel harmony occurs only in three occasions.

5.3. Other observations:

Apart from the phonological processes discussed above, some other observations that aome to light by the end of study are noted below.

❖ **Homonymy**

It was observed that the child exhibited homonymy in some contexts. In the current study as Williamson's classification of phonological processes was used, these could not be accounted for. Hence, they are listed separately here. The following pairs of words showed homonymy.

/χa:.li/ 'my uncle' and /ħa:.li/ 'good' both are represented as /ħali/

/ʁa:.li/ 'costly' and /ʕa:.li/ 'high' are represented as /ʕa:li/

/wa.ra.geh/ 'sheet' and /wa.la.geh/ 'talkative' are pronounced as /wa.la.deh/

Considering the phonology of these words, it can be noted that they are phonologically similar.

❖ **Phonological development**

It was also found that the child was developing normally towards acquiring the phonemic inventory. By the age of 3:6 the child had almost completed the phonemic inventory of her mother tongue except for three phonemes; the two uvulars / χ /and / ʁ / and the trill / r /. Also, the two uvulars / χ /and / ʁ / start to appear first in initial positions.

❖ **Phonological Processes**

It was also observed that in the three months' time, the child had overcome some of the phonological processes like, fronting, stopping and vowel harmony completely. The other processes were decreasing gradually except for lateralization and Pharyngeal replacement which continued to be exhibited.

6. Conclusion

Given below is a summary of the results and findings of the current study on phonological processes noticed in the speech of the child under consideration during the process of acquiring the phonology of her mother-tongue.

Phonological processes are universal property to all languages and each language shows some language-specific processes. Thus the major processes observed in the present study were structural processes (consonant deletion, cluster reduction, syllable deletion and metathesis) followed by systemic processes (fronting, backing, laterlatization, pharyngeal replacement, stopping, assimilation and vowel harmony). Among systemic simplification processes, substitution processes scored the highest frequency of occurrence. Within substitution processes, fronting constituted the highest followed by lateralization, backing then by pharyngeal replacement. In general, it was also found that some phonemes are acquired first at syllable onsets and later on coda positions.

It was found that the child is developing normally towards acquiring the phonemic inventory except for only three phonemes; the two uvulars / χ /and / ʁ /and the trill / r / though the two uvulars / χ /and / ʁ / started to appear first in initial positions.

In addition, it was noted that phonological systems are acquired through a number of stages but they vary from one language to another and most of the times they even vary from a child to another. It was also proved that consonants which have been considered to be late by some English and Arabic studies are not all late in all children.

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