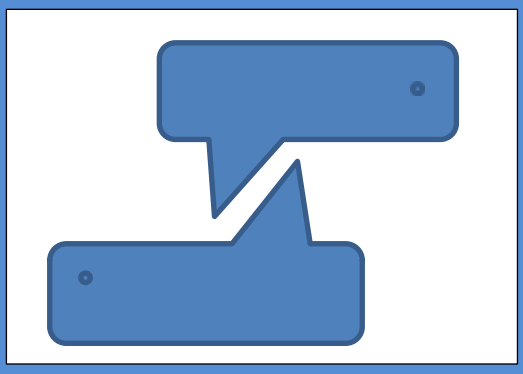
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Table of Contents

Research Articles	***Pages***
Development of anticipatory coarticulation of /u/ in typically Malayalam speaking children in the age range of 3-6 years **Litna A. Varghese**	*1105-1115*
Creativity in children's speech development: a case study of Persian speaking children **Samad Mirza Suzani**	*1116-1136*
The acquisition of pharyngeals by Arabic-English bilingual and monolingual Arabic children: A case study **Hakam Ghanim**	*1150-1169*
Review Articles	
Investigating willpower's role in child language acquisition: a theoretical perspective **Iftekhar Ahmed Noton**	*1137-1149*

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Development of anticipatory coarticulation of /u/ in typically Malayalam speaking children in the age range of 3-6 years

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Abstract

Coarticulation is the articulation of two or more speech sounds together, so that one influences the other. Coarticulation is language dependent and can vary from children to adult. Studies in the past have shown that children have more coarticulation than adults; adults have more coarticulation than children; children and adult have similar coarticulatory patterns. Malayalam is a Dravidian language with extra lip rounding feature and also with five place of nasal articulation. The present study investigated the development of anticipatory coarticulation of /u/ in typically developing Malayalam speaking children in the age range of 3-6 years. The data was collected from 60 participants using bisyllabic meaningful words depicted in flashcards. Data were recorded using Sony audio recorder and analyses were done using PRAAT software. Results showed that children did not follow a particular developmental trend, but 4.6-5 years old children showed a different trend compared to children in other age groups.

Keywords: coarticulation, terminal frequency, transition duration, speed of f2, extent of f2

1. Introduction

"Coarticulation in broader manner refers to the fact that a phonological segment is not realized identically in all environments, but often apparently varies to become more like an adjacent or nearby segment" (Kuhnert & Nolan, 2000). Physiologically coarticulation is the simultaneous movement of two articulators. Acoustically it is the overlapping acoustic property of one phoneme to another. Perceptually it is a phoneme perceived in anticipation after another phoneme. In adult speakers, Abelin, Landberg, and Persson (1980) found that coarticulation often involves a "look-ahead" strategy, whereas children's labial coarticulation tends to be more time-locked, with the temporal extent of anticipation becoming more prominent with age.

Previous studies on developmental patterns of coarticulation have yielded mixed results. Some studies suggest that children exhibit more coarticulation than adults (Nittrouer, Studdert-Kennedy, & McGowan, 1989; Nittrouer, Studdert-Kennedy, & Neely, 1996; Nittrouer& Whalen, 1989), while others report the opposite, with children showing less coarticulation

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than adults (Hodge, 1989; Repp, 1986; Sereno & Lieberman, 1987). A third set of findings reveals that although children and adults exhibit similar patterns of coarticulation, children tend to show greater variability in their coarticulatory patterns (Goodell & Studdert-Kennedy, 1993; Katz &Bharadwja, 2001; Katz, Kripke, &Tallal, 1991; Nittrouer, 1993; Sereno, Baum, Marean, & Lieberman, 1987; Sharkey & Folkins, 1985; Sussman, Duder, Dalston, & Cacciatore, 1999; Turnbaugh, Hoffman, & Daniloff, 1985).

These mixed findings suggest that coarticulation may be influenced by various factors, including age, linguistic experience, and language-specific characteristics. Importantly, the development of coarticulation is not a uniform process across languages. Some studies suggest that coarticulation patterns can be language-dependent, showing variations both across languages and between adults and children. For example, language-specific phonetic features, such as lip rounding or nasality, may guide the development of coarticulatory patterns in particular ways. However, the claim that coarticulation patterns are language-dependent has not been sufficiently explored in many languages, especially in terms of how they might vary across different developmental stages.

This study focuses on Malayalam, a Dravidian language that exhibits unique phonetic features, such as extensive lip rounding and nasality, which may influence coarticulation development. Malayalam's consonant system is also distinctive, featuring a rare five-place articulation contrast for stops and nasals (Mohanan & Mohanan, 1984), whereas English only has three places of articulation for these consonants. Given these language-specific features, the development of coarticulation, particularly anticipatory coarticulation involving lip rounding, may differ in Malayalam-speaking children compared to those learning other languages, such as English.

The primary aim of the present study is to investigate the development of anticipatory coarticulation in Malayalam-speaking children aged 3–6 years, specifically examining the coarticulatory effects of the vowel /u/ when preceded by various consonants. In particular, the study seeks to:

1. Measure the transition duration of the F2 formant during coarticulation,
2. Assess the terminal frequency of F2, and
3. Evaluate the extent and speed of F2 transitions in this vowel-consonant context.

This research aims to provide insights into the ontogenetic development of coarticulation in a language with distinctive phonetic features, with implications for understanding language-specific and age-related differences in coarticulatory patterns.

2. Methodology

1.1. Participants

Participants were 60 Malayalam speaking typically developing children in the age group of 3 – 6 years with an age interval of 6 months, that is 3≥ 3.6, 3.7≥ 4, 4 ≥ 4.6, 4.7 ≥5, 5≥ 5.6, and 5.7≥ 6 years. Each group included 10 children with 5 males and 5 females. 3 to 6-year age range period captures

crucial developmental changes in speech motor control, including the refinement of coarticulatory patterns. Coarticulation, particularly anticipatory coarticulation, is known to mature through early childhood as children gain better control over their speech articulators.

Inclusion criteria:

1. They shall be native speakers of Malayalam (informally assessed).
2. They shall not have any history of hearing and visual impairment, speech and language impairment, cognitive deficits, or any motor deficits at the time of data collection.
3. All participants should belong to middle class from urban part of Kerala (modified Kuppuswamy socio economic scale, 2023).

1.2. Data collection and processing

The material was a list of 14 bisyllabic meaningful words. The structure of the target word was C1V1C2V2, where C1 was /k/ (velar unvoiced stop) /g/ (velar voiced stop), /p/ (bilabial unvoiced stop), /b/ (bilabial voiced stop) /m/ (bilabial nasal), and /j/ (palatal approximant). V1 was either long or short vowel /u/. Pictures depicting the words in a 3 x 3 flash card formed the material. If the child fails in naming the pictures, repetitions were given as prompts. Table 1 shows the material of the study.

Table 1
Material of the study

C1	Word with V1 as /u/	Word with V1 as /u:/
k	/kuda//kutti//kuppi/	/ku:də/
g	/guha/	
P	/puli//puttə/	/pu:və/
b	/bukkə/	
m	/mudi//mutta/	/mu:ɳa/ /mu:kə/
j	/juva/	

Note: /kuda/means umbrella, /kutti/means child, /kuppi/ means bottle, /ku:də/means nest, /guha/ means cave, /puli/ means tiger, /puttə/means a common breakfast of kerala, /pu:və/means flower, /bukkə/means book, /mudi/ means hair, /mutta/ means egg, /mu:ɳa/ means owl, /mu:kə/ means nose and /juva/ is youth

Participants were seated comfortably and tested individually. Pictures of the target words were presented visually to the participants who were instructed to name the picture five times. The utterances were audio recorded by placing the microphone at a distance of 10 cm from mouth of the speaker at 44100 Hz sampling frequency using a digital tape recorder (Sony ICD-UX533F audio recorder). The audio recorded samples were given to 3 Speech-Language Pathologist for the correctness utterance of C1V1. Speech-Language Pathologists were Post graduates who has at least 2 years of experience in the area of speech sound disorders. Three of the five recordings in which C1V1 are correctly uttered was used for further analysis.

1.3. Data analysis

The samples were displayed as waveform and bar type wideband spectrograms using PRAAT (Boersma and Weenink, 2012).The following four parameters were extracted for each word.F_2 Transition Duration (ms) is the duration of the formant transition was measured as the time difference in ms between the onsets of F2 transition at the beginning of the vowel till the steady state of the same. Terminal frequency (Hz) was measured as the frequency of F_2 at the onset of vowel following the stop. The onset of the steady state of the vowel was defined as the point at which the F2 frequency stabilized and no longer exhibited a significant transition. This was determined manually by inspecting the spectrogram and identifying the point where the frequency of F2 remained relatively constant for a significant duration. Extent of the F_2 transition (Hz)was estimated by calculating the difference in frequency between the terminal frequency of F_2 and the onset of steady state of the vowel. Speed of F_2 transition (Hz/ms) is the rate at which F_2 moves and was calculated by the following formula: Speed of F_2 transition = E / D, where, E is the Extent of F2 transition and D is the Duration of F_2 transition

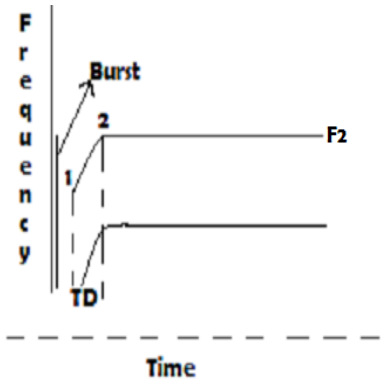


Figure1. Illustration of measurement of parameters

- Transition duration of F_2 = 2 – 1
- Terminal frequency of F_2= 1
- Frequency of steady state at F_2 = 2
- Extent of transition of F_2 = Frequency at 2 ~ frequency at 1
- Speed of transition of F_2 = Extent/ transition duration

Mixed analysis of variance (Mixed ANOVA) was carried out to determine the significant main effect of age (6 age groups), vowel (short and long vowel) and interaction between age and vowel. Multivariate analysis ofvariance (MANOVA) was done to determine the significant difference in age group as a function of each CV syllables, and finally repeated measure analysis of variance (ANOVA) was carried out to determine the significant effect of each CV syllables within each group. Multiple comparisons were accounted for by a Bonferroni adjustment.

3. Findings

3.1. *Terminal Frequency of F2 (F2 TF)*

The mean F2 TF was 1618 Hz and 1223 Hz for short and long vowels, respectively. F2 TF was highest in short vowel /u/ when preceded by palatal

(approximant) place of articulation and lowest when preceded by velar place of articulation (stop); in long vowel /u:/, it was highest when preceded by bilabial nasal and lowest when preceded by velar stop. Table 2 shows the mean and SD of F2 TF for all age groups, vowels and place of articulation.

Table 2
Mean and SD of F2 TF (Hz)

Age group	/U/				AVG	/U:/			Avg
	Stops		Nasal	Approximant		Stops		Nasal	
	Velar	Bilabial	Bilabial	PALATAL		Velar	Bilabial	Bilabial	
3-3.6	1185 (145)	1277 (188)	1389 (200)	2135 (547)	1497	1025 (131)	1139 (213)	1368 (178)	1244
3.6-4	1285 (216)	1462 (190)	1398 (230)	2286 (484)	1608	1245 (244)	1406 (154)	1550 (353)	1401
4-4.6	1238 (129)	1304 (181)	1472 (291)	2980 (473)	1749	1241 (171)	1243 (247)	1478 (254)	1321
4.6-5	1145 (126)	1244 (131)	1300 (256)	2808 (270)	1624	999 (140)	1208 (232)	1397 (268)	1201
5-5.6	1147 (115)	1179 (90)	1211 (210)	3009 (355)	1637	1065 (87)	1097 (132)	1177 (222)	1113
5.6-6	1064 (119)	1144 (183)	1263 (276)	2894 (328)	1591	1006 (151)	1036 (112)	1315 (330)	1119
AVG	1177	1268	1339	2685	**1618**	1097	1188	1380	**1233**

Results of MANOVA showed main effect of age [F (5, 53) = 3.263, P< 0.05], vowel [F (7, 371) = 339.454, P< 0.05] and interaction between age*vowel [F (35, 371) = 5.713, P< 0.05]. F2 TF was significantly higher in 4 – 4.6 years of age and significantly lower in 3 – 3.6 years of age. Results of Post hoc Bonferroni indicated significant difference between F2 TF of 4 – 4.6 years of age and other age groups, 3 – 4 years, 4.6 – 6 years. Further, significant difference between short and long vowels was observed. F2 TF of short vowel was significantly higher than that in long vowel.

3.2. *F2 Transition Duration (F2 TD)*

The mean F2 TD was 40.96 and 33.5 for short and long vowels, respectively. F2 TD was longest when preceded by palatal approximant and shortest when preceded by bilabial stop in case of short vowel /u/; in long vowel /u:/, F2 TD was longest when preceded by velar stop and shortest when preceded by bilabial stop. Table 3 shows the mean and SD of F2 TD for all age groups, vowels and place of articulation. Stops Nasal Approximant Palatal Bilabial

Table 3
Mean and SD of F2 TD

Age group	/U/				AVG	/U:/			AVG
	Stops		Nasal	Approximant		Stops		Nasal	
	Velar	Bilabial	Bilabial	Palatal		Velar	Bilabial	Bilabial	
3-3.6	20 (7)	17 (3)	17 (5)	72 (24)	31.5	31 (23)	23 (6)	23 (3)	25.67
3.6-4	31 (8)	26 (6)	33 (9)	78 (40)	42	40 (11)	35 (11)	40 (11)	38.33
4-4.6	30 (6)	28 (6)	32 (8)	107 (18)	49.25	42 (6)	38(14)	45 (11)	41.67
4.6-5	32 (7)	27 (5)	32 (7)	99(24)	47.5	39 (10)	36 (11)	40 (6)	40.63
5-5.6	19 (4)	17 (3)	19 (3)	82 (23)	34.25	24 (6)	26 (9)	25 (6)	25
5.6-6	24 (7)	20 (6)	27(1)	94 (21)	41.25	33 (8)	32 (6)	31 (6)	32
AVG	26	22.5	26.67	88.67	**40.96**	34.83	31.67	34	**33.5**

Results of MANOVA showed main effects of age [F (5, 54) = 10.669, P< 0.05], vowel [F (7, 378) = 247.011, P< 0.05] and interaction between age*vowel [F (35, 378) = 1.557, P< 0.05]. F2 TD was significantly higher in 4 – 4.6 years of age and significantly shorter in 3 – 3.6 years of age. Results of Post hoc Bonferroni indicated significant difference between 3 – 3.6, 5 – 5.6 years of age and other age groups, 3.6 – 5 years. Further, significant difference between short and long vowels was observed. F2 TD of short vowel was significantly longer than that in long vowel.

3.3. Extend of F2 Transition

The results indicated that mean extent of F2 transition was 439 ms and 205 ms for short and long vowel, respectively. Extent of F2 transition was highest when preceded by palatal approximant and lowest when preceded by velar stop for short vowel /u/ and more when preceded by bilabial nasal and less when preceded by velar stop. Table 4 shows the mean and SD of extent of F2 transition for all age groups, vowels and place of articulation

Table 4
Mean (Hz) and SD of extent of F2 transition

Age group	/U/				AVG	/U:/			Avg
	Stops		Nasal	Approximant		Stops		Nasal	
	Velar	Bilabial	Bilabial	Palatal		Velar	Bilabial	Bilabial	
3-3.6	188 (49)	177 (54)	183 (64)	682 (269)	307.5	142 (34)	168 (54)	175 (31)	161.7
3.6-4	252 (60)	247 (70)	224 (70)	689 (352)	353	248 (70)	300 (88)	260 (66)	269.3
4-4.6	214 (85)	217 (58)	219 (63)	1252 (397)	475.5	210 (61)	229 (82)	257 (45)	232
4.6-5	200 (43)	195 (40)	219 (65)	1439 (321)	513.3	191 (20)	205 (38)	242 (34)	212.7
5-5.6	141 (30)	195 (52)	203 (69)	1439 (421)	494.5	147 (39)	183 ((49)	192 (51)	174
5.6-6	165 (44)	201 (52)	195 (63)	1394 (290)	488.8	165 (61)	186 (45)	186 (35)	179
AVG	193.3	205.3	207.2	1149.2	**438.8**	183.8	211.8	218.7	**204.8**

Results of MANOVA showed main effects of age [F (5, 54) = 9.217, P< 0.05], vowel [F (7, 378) = 361.513, P< 0.05] and interaction between age*vowel [F (35, 378) = 9.188, P< 0.05]. Extent of F2 transition was significantly longer in 4.6 – 5 years of age and significantly shorter in 3 – 3.6 years of age for short vowel /u/; it was significantly longer in 5.6-4 years of age and significantly shorter in 3-3.6 years of age in long vowel /u:/. Results of Post hoc Bonferroni indicated significant difference between 3 – 3.6 years of age and other age groups, 4 – 6 years of age and other age groups. Further, significant difference between short and long vowels was observed. Extent of F2 transition short vowel was significantly longer than that in long vowel.

3.4. Speed of F2 Transition

The results indicated that mean speed of F2 transition was 9.5 ms and 6.7 ms for short and long vowel, respectively. Speed of F2 transition was highest when preceded by palatal approximant and lowest when preceded by velar stop in short vowel /u/; it was highest when preceded by bilabial nasal and lowest when preceded by velar stop in long vowel /u:/. Table 5 shows the mean and SD of speed of F2 transition for all age groups, vowels and place of articulation

Table 5
Mean (Hz/ms) and SD of speed of F2 transition

Age group	/U/				AVG	/U:/			Avg
	Stops		Nasal	Approximant		Stops		Nasal	
	Velar	Bilabial	Bilabial	PALATAL		Velar	Bilabial	Bilabial	
3-3.6	8 (2)	11 (4)	9 (2)	9 (2)	9.25	7 (2)	7 (4)	9 (5)	7.7
3.6-4	8 (2)	10 (2)	8 (3)	9 (3)	8.75	7 (2)	10 (4)	7 (2)	8
4-4.6	7 (2)	9 (2)	6 (2)	12 (2)	8.5	5 (1)	8 (4)	6 (1)	6.3
4.6-5	6 (1)	8 (1)	7 (1)	13 (4)	8.5	5 (1)	6 (2)	6 (1)	5.7
5-5.6	9 (2)	11 (4)	10 (3)	16 (2)	11.5	6 (1)	7 (2)	8 (2)	7
5.6-6	6 (2)	11 (4)	9 (3)	15 (3)	10.25	5 (2)	6 (2)	6 (2)	5.7
AVG	7.3	10	8.2	12.3	**9.5**	5.8	7.3	7	**6.7**

Results of MANOVA showed main effects of age [F (5, 54) = 5.247, P< 0.05], vowel [F (7, 378) = 15.834, P< 0.05] and interaction between age*vowel [F (35, 378) = 2.181, P< 0.05]. Speed of F2 transition was significantly less in 4.6 – 5 years of age and significantly high in 5.6 - 6 years of age in short vowel /u/ and significantly low in 4.6 – 5 years of age and significantly high in 3.6 - 4 years of age in long vowel /u:/. Results of Post hoc Bonferroni indicated significant difference between 5 – 5.6 years and other age groups; 3 – 5 and 5.6 – 6 years. Further, significant difference between short and long vowels was observed. Speed of F2 transition of short vowel was significantly high than that in long vowel.

4. Discussion

The primary objective of this study was to examine the development of anticipatory coarticulation in Malayalam-speaking children, specifically focusing on the effects of consonant context on the F2 characteristics of the vowel /u/ in both short and long vowel contexts. Our study aimed to measure the terminal frequency,

transition duration, extent, and speed of F2 transitions, and to investigate developmental changes across different age groups.

4.1. Language-Specific Effects: The Role of Lip Rounding

Our first key finding relates to the influence of lip rounding on F2 characteristics. We found that the mean terminal frequency of F2 was significantly higher in short vowels compared to long vowels. This result may be interpreted in the context of articulatory dynamics: in short vowels, there is a need for the articulator (likely the tongue) to transition more quickly between positions. This faster articulatory movement might contribute to the observed higher terminal frequency of F2. However, it is important to clarify that this observation likely pertains to tongue movement rather than lip movement, as the primary articulatory feature of interest in this study was lip rounding. The F2 distinctions associated with tongue positioning (e.g., anterior-posterior tongue movements) may better account for this finding, which underscores the importance of considering tongue displacement rather than speed when interpreting F2 transitions.

Furthermore, we observed that the mean terminal frequency of F2 was highest when preceded by a palatal approximant and lowest when preceded by a velar stop, especially for the short vowel /u/. This finding is consistent with previous research that reports higher F2 frequencies for palatal consonants compared to other places of articulation (e.g., Liberman et al., 1972; Kent & Read, 2002). Additionally, the fact that velar stops yielded the lowest terminal frequency in /u/ was intriguing and warrants further exploration. We hypothesize that the consonantal constriction in the lip region (as seen in both bilabials and vowels like /u/) might mitigate the effects of vowel-consonant interactions when compared to the stronger articulatory influence of velar constrictions. This suggests that the coarticulatory effects of vowel lip rounding may interact differently depending on the specific consonantal context, further emphasizing the language-specificity of coarticulation.

4.2. Consonantal and Vowel Context Effects

Next, we found that the mean transition duration of F2 was significantly longer in short vowels compared to long vowels, even after excluding the palatal approximant. This finding aligns with the idea that articulators need to "traverse" a greater distance more quickly in short vowels, which likely results in shorter transition durations in comparison to long vowels. The result is also consistent with previous studies (Savithri, 1989) that reported transition durations in the same range (approximately 33.5 ms).

The transition durations were notably longer when the vowel was preceded by a palatal approximant and shorter when preceded by bilabial stops, particularly in the short vowel /u/. This could be due to the fact that approximants typically involve the articulation of two vowel sounds (/i/ and /a/ in this study), leading to a longer transition duration due to vowel modification. In contrast, bilabial stops and nasals, which involve constrictions at the lip end, might not be influenced as strongly by the vowel's lip rounding, resulting in shorter transition durations.

4.3. Developmental Trends in Coarticulatory Behavior

Our results also suggest age-based differences in coarticulatory behavior, with significant developmental changes observed across the three age groups. The terminal frequency of F2 was significantly higher in children aged 3.6–4 years and significantly lower in children aged 5–5.6 years, even when excluding the palatal approximant. Interestingly, these results do not align with findings from Repp (1986), where a 4-year-old speaker showed no systematic differences in coarticulatory patterns across different linguistic contexts. Our results are more in line with Perumal (1993), who reported no linear developmental trend for coarticulation. These findings suggest that coarticulatory patterns in younger children may be influenced by different factors, such as vocal tract size and speech motor maturation.

Moreover, while Sereno and Lieberman (1987) suggested that coarticulatory patterns become more consistent with the fine-tuning of speech motor patterns as children mature, our study did not reveal a clear developmental trend in F2 terminal frequency, further emphasizing the complexity of coarticulation development.

4.4. Transition Speed and Age Effects

Transition speed, calculated as the extent of F2 transition divided by the transition duration, was significantly higher in short vowels compared to long vowels. This finding could be explained by the combination of greater extent and shorter duration in short vowels. The speed of F2 transition was highest when preceded by palatal approximants and lowest when preceded by velar stops in short vowels, and highest when preceded by bilabial nasals and lowest when preceded by velar stops in long vowels. These patterns reflect the interaction between consonantal and vowel contexts, where the presence of palatal constrictions leads to higher F2 frequencies, while velar stops lead to lower F2 frequencies, consistent with the effects of lip rounding and articulatory timing.

Significant differences in transition speed were also observed across age groups. Children aged 4.6–5 years exhibited significantly lower speeds in the short vowel /u/, while those aged 5.6–6 years showed significantly higher speeds. This may reflect increased control over speech motor patterns with age, particularly in terms of articulatory adjustments related to lip rounding and transition planning.

4.5. Comparison with Previous Studies

Finally, we must consider the findings of previous studies, such as those by Repp (1986) and Perumal (1993). Our results diverged from Repp's, who found no systematic differences in younger children's coarticulation, and Perumal's, who reported an increase in transition duration with age. Our findings, which showed no clear developmental trend in terminal frequency or transition duration, suggest that coarticulatory patterns in Malayalam-speaking children might be influenced by unique phonetic features of the language, such as lip rounding and the complex consonant system, which may not follow the same developmental trajectory as seen in languages like English.

5. Conclusion

In sum, this study provides a detailed examination of the development of anticipatory coarticulation in Malayalam-speaking children, shedding light on the complex interplay of linguistic factors, developmental age, and articulatory processes. While some of our findings align with previous studies, others suggest that Malayalam-specific phonetic features, such as lip rounding and nasality, play a significant role in shaping coarticulatory patterns in young children. Future studies should further explore the developmental trajectory of coarticulation in Malayalam, with particular attention to the interaction between language-specific phonological features and age-related motor development. A future extension of this study could involve comparing the coarticulatory behavior of adults with the current child participants to better understand the development of mature coarticulatory patterns in this language.

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Creativity in children's speech development: a case study of Persian speaking children

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Abstract

This study aimed to investigate the innovations in speech development of Persian speaking children based on naturalistic paradigms of child language research. To this end, following a longitudinal observation approach, the naturalistic and experimental aspects of child language acquisition were examined as it was considered to have the advantage of producing spontaneous natural data. The data consisted of utterances by a number of children at an age range of 1;10 to 4;10 since it is considered a productive period for the creation of new words. The participants of the study included the researcher's own son, his brother-in-law's son, his niece and nephew, his neighbors' children, as well as a few children from a child-care center in Noshahr, Iran. To investigate the innovations in speech development of these children, instances of deletion, substitution, and inversion as well as creative processes such as making negative verbs, innovative rule-making in the utterances, and rule-overgeneralizing for inserting inflections were collected and recorded. The findings of this study chiefly support Clark's (1981) argument that creativity in children's speech results from the need of finding an acceptable word to fill a gap in the lexicon. Moreover, the findings confirm Lust's (2006) claim that children rely on their creative theory construction as a compensatory tool and productive device to create new words. Alternatively, the innovations that do not conform to the adult forms indicate that children have not learned the exceptions to the rules and less productive inflections conveying the same meaning; or may tend to convey the message from their own perspectives and to encode the events accordingly. The small sample used was a limitation of this study, nonetheless to arrive at broader generalizations, more supporting evidence from conducting studies on children's differences, their social interaction with others, and the role of linguistic input are recommended.

Keywords: creative processes, creative theory construction, innovative rule-making, Persian speaking children, speech development

1. Introduction

It is almost clear that any adult who tries to communicate with small children will experience creativity in children's speech development at some point. However, it is normal for mistakes (e.g., phonological deviations) to be made during this process. Based on Clark (1980), we often come across children using words which are not common in adult speech. This type of

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productivity and lexical creativity is widespread among children acquiring various languages. Regarding productivity/creativity in children's speech development, it is apparent that speech development in children is a gradual process during which speech patterns are first reproduced, and then eventually acquired. It can be postulated that since young children are still developing their *creatively-established* sound systems, their speech can at times be difficult to understand. This is particularly true in very young children, specifically those under the age of five, since they have not yet mastered the ability to organize sound systems in the same way that adults do.

Lust (2006) argues that the first twelve months prepare children for the crucial acquisition of first words. Yet as in the acquisition of syntax and phonology, the first twelve months only begin a long course of discovery and linguistic creation in the area of semantics. This course is marked by creativity and abstract construction by the child. O'Grady (2005), in the same vein, believes that from around age thirteen or fourteen months, give or take a few months in either direction, children start producing recognizable words. In this vein, creativity in children's speech development will be the central issue of the present study to be probed in more detail.

1.1. Analytic style vs. gestalt style of language learning

According to Peters (1977), a natural feature of language learning among children is that they do not necessarily have similar learning styles, for instance some children are initially better than others at finding words. In fact, there appear to be two different styles of language learning. The *analytic* style focuses on breaking speech into its smallest component parts from the very beginning. Children who use this style produce short, clearly articulated, one-word utterances in the early stages of language learning. They like to name people (*Daddy*, *Mommy*) and objects (*kitty*, *car*), and they use simple words like *up*, *hot*, and *hungry* to describe how they feel and what they want.

On the other hand, in the *gestalt* style of learning children take quite a different approach. They memorize and produce relatively large chunks of speech. Children's chunks of speech may often be poorly articulated and correspond to entire sequences of words in the adult language. This holistic sort of language learning is known as *gestalt* style. As we know, "Gestalt" is the German word for *shape*, and is used by psychologists to refer to patterns that are perceived as wholes. Based on O'Grady (2005), the following illustration gives some examples of gestalt style learning in English:

Child's utterance	**Meaning**
Whasdat?	"What's that?"
Dunno	"I don't know"
Donwanna	"I don't want to"
gimmedat	"Give me that"
awgone	"All gone"
lookadat	"Look at that"

(O'Grady 2005, p.11)

Some major characteristics of *analytic* and *gestalt* styles of language learning are illustrated in Table 1.

Table 1
Basic characteristics of analytic style vs. gestalt style of language learning (O'Grady, 2005)

Analytic Style	Gestalt Style
children initially better at finding words	children better at relatively large chunks of speech
speech broken into its smallest component parts	bulky chunks of speech memorized and produced
short, clearly articulated, one-word utterances	chunks of speech often poorly articulated
produced in the early stages of language learning	speech corresponded to entire sequences of words in the adult language
naming people and objects in the early stages of language learning	generally including holistic sort of language learning

Most of the psychologists believe that in spite of variations, it is probably best to think of the analytic–gestalt contrast as a continuum. In this vein, O'Grady (2005) suggests that no child employs a completely analytic strategy or a purely gestalt style. Rather, children exhibit tendencies in one direction or another.

A question may raise here, "Is there a reason why some children are more toward the gestalt end of the continuum and others more toward the analytic end?" The answer could be positive. However, the issue will be investigated later in the current study when we talk about the meanings of children's early utterances. However, the important point to remember is simply that both approaches to language learning work equally well, so there's no reason to be concerned about whether a particular child is following the right path or not.

1.2. Naturalistic vs. experimental paradigms of child language acquisition

Language acquisition is considered to be a complex, gradual, and creative process for children and hence it appears axiomatic that there is no single way of studying child language acquisition. Thus, when one begins to explore the literature in this area he/she will encounter a number of different research approaches. The two main methods of collecting data for this purpose are known as naturalistic and experimental. Naturalistic paradigms collect a sample of a child's spontaneous language use by recording it in familiar and comfortable surroundings, while experimental paradigms typically elicit a sample of the child's language through a specific task.

In the process of language acquisition, children progress at different developmental levels which most often vary from child to child, although the differences could become less prominent approximately around the age of five years. On the other hand, as Clark (1981) believes, whenever adults hear

children's new creations, they may easily interpret the intended meaning from the context and usually laugh at such childish "innovations". Adults, however, do not stop and think how and why children create these words. Considering this point, creativity in children's speech development, will be the central issue of the present study to be studied and discussed in more detail. More specifically, this study primarily aims to investigate and analyze the innovations in speech development of Persian speaking children and to scrutinize the strategies employed for their creation of new words.

2. Methodology

Considering the above-mentioned naturalistic and experimental dichotomy, the trend was mostly toward naturalistic paradigms of child language research in the present study, since it was recognized to have the advantage of producing more spontaneous, natural data. It also had other merits. During the study, the child was allowed to play freely with toys while talking with parents or other children. Meanwhile, it was mostly attempted that the researcher's presence during the data gathering, not prove disruptive and lead to less "natural" language behavior both from the child and the caregivers.

2.1. Participants

The data collected for the present study mainly consisted of utterances by different children including my own child (Samsam, who was then 2;2), my brother-in-law's son (Sina, 2;1), my niece (Atena, 2;10), my neighbors' children (Vania, 3;6, Behnad, 3;1, Mohana 3;8, and Roza 4;0), and also utterances by some children from a child-care center in Noshahr. I also took advantage of my nephew's retrospective utterances in the past (Mohammad, who was then 7;2), asking my brother to think *back* and record his reminiscences of his son's utterances, when he was almost 4;6.

The children between the ages 1;10 and 4;10 were selected purposefully, since it could be considered a productive period for the creation of new words.

2.2. Data collection and processing

The study started in October 2009, while my son, Samsam, was only 1;3 years old. To me, the way he developed his language oral skills was a great impetus to conduct the present study, over which I could generally track the child's ability in the creation and innovation of new words. It was almost self-evident to me from the very beginning that in such a far-reaching and time-consuming project, the researcher could not simply suffice to his own limited observations of simply one subject. Hence, I demanded for assistance on behalf of my wife who had some friends in a child-care center in Noshahr, Iran. In the meantime, some other people, including my relatives and neighbors were called for giving contributions to the advancement of the present study.

The children between the ages 1;10 and 4;10 were selected purposefully, since it could be considered a productive period for the creation of new words. Thus, the sources for data collection were:

1. my longitudinal record of my son's spontaneous utterances;
2. recordings of the speech of my 2;10-year-old niece and 2;1-year-old brother-in-law's son;
3. retrospective inquiries in which some neighbors were asked to think *back* and answer questions about their children' past;
4. casual observations and reports made over a long period of time, of under-four-year children in one of the child-care centers in Noshahr.

2.3. Data analysis

After data collection, the data including instances of deletion, substitution, and inversion as well as creative processes such as making negative verbs, innovative rule-making in the utterances, and rule-overgeneralizing for inserting inflections were analyzed qualitatively and descriptively.

3. Findings

Universally speaking, children, from the very beginning, creatively confront the acquisition of word and sentence meaning. We see that what may look like deformation in the child's early productions and in their early word meanings, actually indicates the child's linguistic innovations creative advancement.

The findings of the present study are for the most part based on the recordings of such creativity in the children's early productions. The study was based on wide-ranging personal observations and naturalistic data gathered longitudinally. For this purpose, for the majority of the data gathered I focused on the individual speech development of my own child, however, a few other children were also called for participation as the subjects of the present study. In Table 2 a classification of lexical development of Samsam in the first 20 months is illustrated.

Table 2
Classification of lexical development of Samsam in the first 20 months

People	daddy[baba], mommy[mama], baby[nini]/[nene]
Animals	dog[ha:pu], kitty[miomio], bird[juje], duck[kwak]
Body parts	eye [chesh], ear [gush]
Food	banana [moz], apple [tib], milk[a:m]/[ha:m]
Toys	ball [tu:], car [bi:b bi:b]
Cloths	shoe [kash]
Household objects	carpet [ka:li], keys [teli:d], spoon [kashok]
Routines	bye[ba:bai], hi [dala:]/[dala:m], no [na]
Sound imitating words	[moo], [meow], [baa baa],[kookoo], [kwak], [qa:r qa:r]
Activities	riding /playing with a car[bi:b bi:b], going to sleep [la:la:], eating/ asking for eating [ha:m]/[ha:mha:m]
Feelings and Emotions	fear[u:f]/[u:ffi], hatred/disgust [ax]/[kex], love [bahbah]

3.1. Findings on the Stages of language development

3.1.1. The babbling stage

After a long period of gurgling and cooing, children begin to babble usually around the six-month period. It consists of producing long sequence of vowels and consonants.

The importance of babbling is as follow: First, it serves primarily as practice for later speech. Second, children babble for social reward or simply for sheer pleasure (Jannedy 1994, p.268). During the babbling stage, the pitch or intonation contours of infants' utterances begin to resemble the intonation contours of sentences spoken by adults. Examples of this stage from Persian are:

1. [mamama]
2. [bababa]
3. [dadada]
4. [dededa]

(For a phonological transcription see Appendix I).

3.1.2. The holophrastic stage

Usually after one year, children begin to use the same string of sounds repeatedly to 'mean' the same thing. At this point of time, they have learned that sounds are related to meanings and they are producing their first 'words'. The holophrastic stage is known to vary from child to child and usually has nothing to do with how intelligent the child is. Most children seem to go through the 'one-word =one sentence' stage. According to Stubbs (1995:379) "holophrases are a feature of early child language". These one-word sentences (if one can call them sentences at all) are called holophrastic sentences. The first words uttered by a one-year-old child are typically utilized to name people, objects, pets, and other familiar and important parts of its environment. The first words also may show the child's reaction to the environment. The child's vocabulary soon comes to include verbs and other useful words as well as nouns. In Table 3 Samsam's speech development from 0;10 to 1;10 is presented.

Table 3

Samsam's speech development from 0;10 to 1;10

Age	Vocabulary Advancement
0;10	[baba], [na], [ta:ta], [ta:ti], [tu:]
0;11	[mama], [babai], [dal], [da:lli]
1;0	[nene], [nini], [bahbah]
1;1	[ye-do-da], [xoda]
1;2	[babaii], [mamaii]
1;3	[alo], [kojaii]
1;4	[ye-do-de], [kie], [chie], [a:b]
1;5	[maman], [nakon], [qa:r qa:r]
1;6	[beba(r)/bepa(r)], [hai], [dadi], [baibai] (imitations from Walt Disney's *Magic English*)
1;7	[ye-do-de-da], [ju:je], [miow]
1;8	[a:le *meaning* xa:leh], [a:ji], [aziz], [amme],[bia]
1;9	[xo:ka *meaning* xodkar], [az(i)zam], [ghaza xodam]
1;10	[dokto], [dalam], [bi:bbi:b], [babaii kojaii], [mama bia], [mama nakon]

In Figure 1 Samsam's gradual vocabulary advancement at the same stage is illustrated.

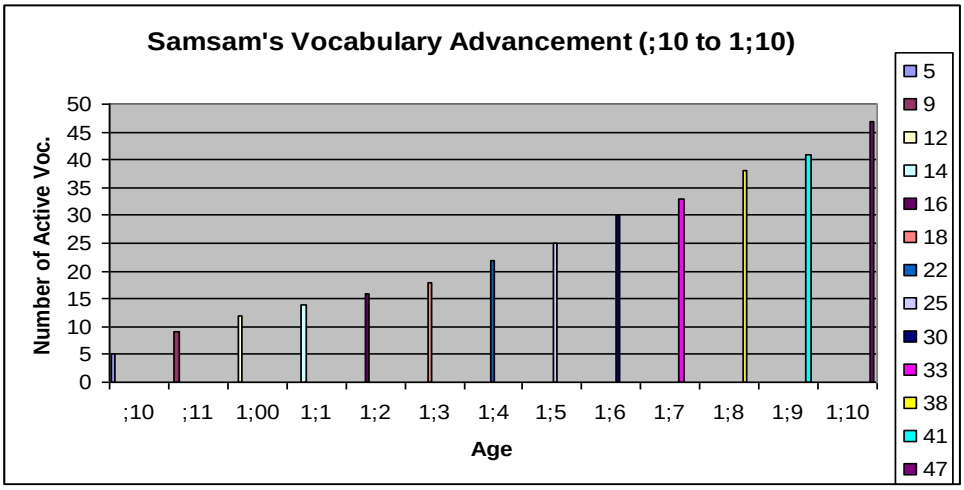


Figure 1. Samsam's vocabulary advancement from ;10 to 1;10

An important point to mention is that, for the most part, there is no clear-cut borderline to the stages of acquisition. In one case, Samsam being too far from his second birthday (when he was only 1;1) began to produce the three-word utterance [ye-do-da] [one two ten] to count! Whether he knew the meaning of the utterance made, and that the utterance was a three-word compound, or even it carried any specific meaning to him remained completely unknown to us. Of course, later the utterance changed into [ye-do-de] [one two three, (*probably*)] and even later into four-word compound [ye-do-de-da] [one two three ten]. The result here most likely indicates that there is no clear-cut borderline to the stages of acquisition and different stages of acquisition can occasionally co-occur, overlap together, or occur earlier or later. A main reason to this phenomenon is the hard fact that there is a great variability among children in the process of language acquisition.

Roughly speaking, a picture of the children's language at the holophrastic stage would most likely illustrate how much the young children has already acquired. Some of the other examples from the children observed and studied were as the following:

1. [baba] [ba:ba:] "father"/"man"
2. [mama] [ma:ma:] 'mother'/"woman"
3. [a:le] "aunt" "woman"
4. [a:ji:] "sister"
5. [u:f] "pain"/ "threat"
6. [bi:b bi:b] "car or any kind of vehicle"
7. [am]/[amam]/[ham] "milk"
8. [nene]/[nini] "baby/ child"
9. [dada] "picnic/going out"
10. [u:f]/[u:ffi] "anything the child is afraid of"
11. [la:la:] "sleep/ go to sleep"
12. [bahbah] "finish"

13. [a:b]/[a:bbe] "water/ I want water"
14. [ham] "food/ I want food"
15. [bede] "give me"
16. [maneh] "mine"
17. [aziz] "grandmother"
18. [xoka:] "pen"
19. [ju:jeh] "bird/s"
20. [xes]/[xesi] "teddy bear"

What is more interesting than merely the list of the child's vocabulary is the way the child uses these words:

a. When the child first began to use these words, the stimulus had to be present. But later this was no longer true. For example [bi:b bi:b] was first only used by Samsam when pointing to a car or any other vehicle in the street, but, later was used by him in pointing to pictures, toys or in asking to go in the car.

b. While many of these single forms are used for naming objects, they may also be produced in circumstances that suggest that the child is already extending their use. For example pointing to an empty bed while uttering the name of a teddy bear (say, Xe(r)si) who sleeps in the bed, even in the absence of the toy named, is an indication that the child could be capable of referring to the teddy bear (Xe(r)si) and the bed, but is not yet ready to put the forms together to produce a more complex phrase.

c. It has been noticed that only the words for animals which exist in the child's environment are replaced by their sounds, for example, [miao] for the cat, [kokoko] for the cock and [ha:p ha:p] (and later, [wohwoh]/[howhow]) for the dog; as a result, animals which do not exist in his/her environment are called [momo]/ [ha:p ha:p].

d. Phonologically the child's first words are like the words of most children at this stage of learning Persian, English and other languages, generally monosyllabic with a CV (Consonant-Vowel) form. The vowel part may be diphthongal, depending on the language being acquired. Its phonemic or phonetic inventory (at this stage they are equivalent) is much smaller than is found in the adult language.

e. The child's phonological inventory includes the consonants [b, m, d, t, k] which are frequently occurring sounds in the world's languages.

Many studies (Brown, 1973; Hopper and Naremore, 1978; Jannedy 1994) have shown that children in the holophrastic stage can perceive or comprehend many more phonological contrasts than they can produce themselves. Thus, at this stage, it is not possible to determine the extent of the grammar of the child simply by observing or noting child's speech production. Following Chomsky (1965), McNeill (1970) argued that knowledge of basic syntactic relation is innate and that children's experience with language merely provides the children with information for learning the relevant surface structures of their native languages. McNeill argued that single-word utterances have the underlying representation of a full sentence but that only one element of this underlying structure is realized in the

surface structure. Bloom (1973) also pointed out that children are not constrained to utter only one word at a time. Utterances longer than one word occur but they do not contain more than one word meaningful element.

3.1.3. The two-word stage

Around the time of their second birthday children begin to produce two-word utterances. However, this can occur earlier or later, since there is a great variability among children. At first two-word utterances appear to be strings of two of the child's earlier holophrastic utterances, each word with its own single-pitch contour.

Children begin to form actual two-word sentences, with the relation between the two words showing definite syntactic and semantic relations and intonation contours of the two words extending over the whole utterances rather than being separated by a pause between them. The two-word stage is a remarkable stage in the child's life during which the child acquisition emerges rapidly after his one-word stage. Now, the child is able to produce two - element utterances and makes semantic relationship between them such as:

i. Agent + Action
ii. Action + Location
iii. Action + Object

The following examples illustrate the kinds of patterns which were found in children's utterances at this stage:

1. [ma:ma: bia:] "Come, Mommy"
2. [tu: bede] "give me (the) ball"
3. [ba:ba:h bi:b] "father car"
4. [ba:ba:h rah] "father went"/ "Did my father go?" (depending on intonation)
5. [kafsh si:na] "Sina's shoe"
6. [ma:ma: nakon] "Don't do that, Mommy"
7. [nene lala]/ [nini lala] "(the) baby is sleep"
8. [miao ham/am] "(the) cat is eating"
9. [ba:ba:ii kojaii] "Where are you, Daddy?"
10. [ghaza xodam] "I had food"

The examples above could be evocative, and analysis of the data gathered through above examples shows some interesting hints about children speech development. Some points are as the following:

a. During the two-word stage, there are no syntactic or morphological markers, that is, no inflections for number or person or tense or gender and so on. For example, the child may address present as past, a singular as a plural or vice versa, or in languages like English or Arabic in which there is male-female distinction, the child may address a female as a male or vice versa. In general, pronouns are rarely used, although many children do use [man] "I"/"me" to refer to themselves and some children use other pronouns as well. It has been noted that in Noun + Noun sentences, such as [ka(f)sh Sina] "Sina's shoes", the two words can express a number of different

grammatical relations which will later be expressed by other syntactic devices. Thus, depending on different contexts, the phrase [ka(f)sh Sina] can be used to show possessive relation when the child is pointing to Sina's shoes or to show a Subject + Object relation in the situation when the mother is putting the shoes on the child or as a question " Is Sina putting his shoes too?" or as a request "I want to put Sina's shoes on." Another example is [ba:ba bi:bbi:b] which could probably mean "This is Daddy's car" or "Daddy went in his car" or the child is asking his father to take him in the car.

b. In this stage, children exhibit more phonological processes than adult speech does. Phonological processes may include deletion, inversion, or substitution. For example, William (1995) reported misanalysis of word-final "s" in English in the speech of a two year old child called April, as the following:

Word	**April's "singular" form**
box	bok
lens	len
trapeze	trappy
clothes	clo
Santa Claus	Santa Clau
sentence	sentent
upstairs	upstair

(Cited in O'Grady 2005, p.11)

According to William (1995) around age two, April was heard to say *bok* as the singular of *box*, *clo* as the singular of *clothes*, and even *sentent* as the singular of *sentence*. Finally, he concluded that breaking sentences into parts, in general, gets easier as children learn more words and become better at figuring out where one word ends and another one begins.

In the case of our subjects, children exhibited various phonological processes including deletion, inversion, or substitution. For instance, Samsam was noticed to utter [tup] "ball" as [tu] deleting a whole ending sound, and Sina uttered [salam] "hello" as [dala:] both substituting and deleting the initial and final sounds respectively at the same time. Further examples extracted from other subjects in the study could illustrate the same processes clearly. Some of the most noticeable examples were as follow:

1. [asb] "horse" as [as]/[abs]
2. [por] "full" as [pol]
3. [sala:m] "Hello" as [dala:]/[dala:m]
4. [khasteh] "tired" as [khashteh]
5. [sasa:] for [samsa:m] "name of a boy"
6. [ta:ta:] for [ta:b ta:b] "a play"
7. [azam] instead of [azizam] " my dear"
8. [ota:]/[ota:k] instead of [ota:gh] "room"
9. [as]/[ask] for [aks] "photo"
10. [ku:li]/ [ku:ri] for [ghu:ri] "teapot"

11. [moba:]/[moba:i]/[moba:l] for [moba:il] “mobile”
12. [gha:li] as [ka:ii]/[ka:li] “carpet”
13. [damak] for [namak] “salt”
14. [chesh] for [cheshm] “eye”
15. [faghir] “poor” as [fakir]
16. [shoto] instead of [shotor] “camel”
17. [a:li] instead of [xa:li:] “empty”

c. As was pointed out before, replacing one segment by another was a noticeable process. Further examples of the substitution processes in the subjects under study were as the following:

1. [naka:shi] instead of [nagha:shi] “painting”
2. [cha:wu:] instead of [cha:ghu:] “knife”
3. [teta:b] for [keta:b] “book”
4. [mixolam] instead of [mixoram] “I eat”
5. [mu:che] for [mu:rcheh] “ant”
6. [ta:lik] for [ta:rik] “dark”
7. [donjesh] for [gonjeshk] “sparrow”
8. [loya] for [roya] “name of a girl”
9. [leno] for [reno] “name of a car”
10. [ela:hi:m]/[ebla:ii:m] for [ebrahi:m] “name of a boy”
11. [teli:]/[teli:d] for [keli:d] “key”
12. [deh] for [seh] “three”
13. [bolo] for [boro] “go away” (imperative)
14. [ka:yek] for [gha:yegh] “boat”
15. [gag]/[gagi] for [sag] “dog”

A general analysis of the above utterances reveals that whatever the child actually intends to communicate via such expressions, the significant functional consequences are typically that the adult behaves as if communication is taking place. In other words, the child not only produces speech, but also receives the adults' feedback, which usually confirms that the child utterance ‘worked’ well.

By the age of two, children regularly have a vocabulary of many words (around a hundred); however, children's gradual lexical development at this stage could be noticeable in its own turn. For instance, the use of [gag]/[gagi]“dog” by some subjects in the study instead of previously-used utterance [ha:pu] for the same creature seemed an outstanding example.

In addition, at this stage the children, for the most part, might be treated as interesting entertaining conversational partners by adults and caretakers who intentionally create words to be suitable for children. Some of the example in this area are [hi:ss] “keep quiet/sleep” ;[halo:lo]/[lala:]“go to bed/ asleep”; [namnam]/[amam]/[ha:m] “food” and [?’]/[kex]/ [ax]/ [axi] “something bad/ dirty/disgusting”.

3.1.4. Telegraph to infinity

Jannedy (1994) argues that there doesn’t seem to be any ‘three-word’ sentence stage (p.276). When a child starts stringing more than two words

together, the utterances may be three, four, five words or longer. Earlier, in the study, Samsam (when he was only, say, one year or so) was reported to have produced the three-word utterance [yek-do-dah] to count! Later when he was around 2;00 he converted the utterance to [yek-do-deh] which most likely could be interpreted as [yek-do-seh] [one two three], and even later he changed it into[yek-do-deh-dah] [one two three ten], which seemed to be a telegraphic utterance. Still later, he improved it as [yek-do-seh] [one two three] when he was 2;1 years old.

Telegraphic utterances of children, which are longer than two words, have special characteristics which are more or less common in all languages. For instance, in Persian, like English, the small 'function' words such as [az] "from", [dar] "in", [beh] "to", [ruye] "on"; etc. are missing, and most of the inflections are omitted. Only the words which carry the main message (i.e. the 'content' words) occur. Children often sound as if they are reading a telegram, and that is why such utterances are called 'telegraphic speech'. However, when we refer to these sentences as telegraphic, clearly this could be just a descriptive term, since the child doesn't deliberately leave out the non-content words as does an adult sending a telegram.

At telegraphic stage of language acquisition, child's lexical improvement could be stupendously striking. For instance, many children apply more socially-acceptable forms of words instead of using the simpler *childish* ones. Two examples observed in the study were [sala:mat] for [be sala:mat] "good-bye" instead of more childish [bai bai] and [ma:shi]/[ma:shin]"car" instead of the babyish utterance [bi:b bi:b].

Further examples uttered by the subjects in the study that could better demonstrate this stage of language acquisition are as follow:

1. [ma:shi manemane] "This is my toy car" instead of [in ma:shine mane]
2. [xa:m man] "I want" instead of [mi:xam]
3. [ni:xa:m] "I don't want" instead of [nemi:xam]
4. [da:shtam na] "I didn't have" instead of [nadashtam]
5. [nata:nam] "I can not" instead of [nemitava:nam]
6. [ba:ba: hamum] "Daddy is in the bathroom" instead of [ba:ba: tu: hamumeh]
7. [sala:mat] for [be sala:mat] "good-bye"
8. [mi:mi:na tamu:m]/[mi:mi:na xodam]/[shi:shi: ni:st]"I finished milk" for [shir tamu:m shod]/[shi:r ra: xordam]
9. [nu:masha i:xam] "I'd like Coke" for [nu:shabe mixa:m]
10. [a:b dede] "Give me water" for [a:b bedeh]
11. [arahi:m ela:h] for [bism ela:h erahma:n erahi:m] " In the name of God, Most

Gracious, Most Merciful"

12. [ma:man va:] "open it for me, Mommy" instead of [ma:man va: kon]
13. [ma:ma:nam ba: ma:ma:nam] "I want to go with my Mommy" instead of [mixa:m beram ba: ma:ma:nam]
14. [ba:ba: doto(r) na] "Daddy, I don't want to go to doctor" instead of [ba:ba: doktor nemixam]
15. [a:madi:dam] for [a:madam] "I came"
16. [rafti:dam] for [raftam] "I went"

In Examples (3), (4) and (5), the child was creatively making rules for making negative verbs in different ways; in (6), (13) and (14), he/she was deleting the core word (verb), while innovatively attempting to compensate for the lack of the verb in the utterance; and in (15) and (16), the child was inadvertently overgeneralizing rules for inserting inflections. In other words, he/she was marking the pronoun incorrectly rather than inflecting the verb for appropriate person. In fact, inflection is often an indication of complexity in many languages including Persian, and the order of acquisition is mostly determined by their regularity and essentiality of convergence of meaning. This is the reason why inflections are among the last to be fully acquired in every language, and that a general uninflected main verb (or adjective) is considered all-purpose tool to start with.

When the child begins to produce utterances that are longer than two words, these utterances appear to be 'sentence-like'. They have hierarchical constituent structures similar to the syntactic structures found in the sentences produced by the adult grammar. The child shows what he/she wants to have or where to go or what to do as can in the examples above.

Another noticeable point about this stage is that the child's utterances are not simply randomly strung together words but from a very early stage, reveal his/her grasp of the principles of sentence formation. Utterance number (13), for example, is quite new and unique, since no child will hear an adult produces such an utterance, therefore, the child must have some creative, linguistic capacity, which allows for the creation of utterances like [ma:ma:nam ba: ma:ma:nam] "I want to go with my Mommy". This is supporting the theory of innate capacity given to human beings to enable them to acquire language.

During the study, a kind of assimilatory process in the children's language acquisition was also noted. This assimilatory process frequently results in mismatch between the child's form and the adult model. The examples mentioned below show children's tendencies to assimilate one segment in a word to another.

1. [cheshmesh]/[chemchem] for [keshmesh] "raisin"
2. [bebalam pa:k] instead of [bebaram pa:rk] "take me (to the) park"
3. [gu:fsand] for [gu:sfand] "sheep"

A noteworthy point is that even if the child has acquired particular sound in some words there may be certain contexts where his/her production may be altered.

3.2. Overgeneralization

Children seem to form the simplest and most general rule they can from the language input they receive and to be so 'pleased' with their 'theory' that they are to use the rule whenever they can (Fromkin and Rodman, 1993, p.379). The process of overgeneralization/overextension is common in both first and second language acquisition. In this study, overgeneralization as a strategy to form new words was observed. As an example of generalization, one of the subjects, Mohana (3;8), was observed to use [pa:t] "your foot" instead of [pa:] "foot" to refer to any person's foot/feet. The reason was that

she was exposed to the same form of utterance by her parents, and of course she was unaware of the function of pronoun [t] "your" in Persian. In fact, she overgeneralized the use of the same utterance [pa:t] not only to refer to her own foot but also to all other people's she would imagine, including all present and absent individuals.

In the process of overgeneralization, children typically form hypotheses and test them until they create the language 'rules'. Then they extend the use of grammatical rules beyond their accepted uses generally by making words or structures follow a more regular pattern. Consider the following examples uttered by some of the subjects under study:

1. [pa:t] instead of [pa:] to indicate any person's feet
2. [farda: be pa:rk rafti:m] "We went to the park tomorrow" instead of [di:ru:z be pa:rk rafti:m] "We went to the park yesterday" *or* [farda: be pa:rk mi:ravi:m] "We will go to the park tomorrow"
3. [inja: a:madi:dam] for [inja: a:madam] "I came here"
4. [rafti:dam] for [raftam] "I went"
5. [naqa:shimo neveshti:dam] for [naqa:shimo keshidam] "I drew my painting"

In (1), the child was inadvertently overgeneralizing rules for inserting personal (possessive) inflections. In (2), he/she was employing the verb/adverb incorrectly rather than using them for appropriate tense. In (3), and (4) he/she was marking the pronoun incorrectly rather than inflecting the verb for appropriate person, and finally in (5), he/she was marking both the pronoun and verb incorrectly instead of inflecting the appropriate verb for appropriate person.

The above examples illustrate how children form hypotheses and test them until they formulate the language 'rules' and construct a grammar. Foss and Hakes (1978) argued that the child is most often functioning as a 'little linguist' (P.279), and that is how the Active Construction of a Grammar Theory tries to explain child language acquisition. According to this theory, when children listen to language around them, they make hypotheses about rules for the concept they have heard. These hypotheses form their grammar. Next, children apply their hypotheses/rules in their utterances. The examples mentioned under Overgeneralization, clearly illustrate the process of hypothesis-formation on behalf of the children. Children's hypotheses are based on the few utterances they hear, so their hypotheses are sometimes wrong. When the child discovers that his utterance doesn't match the adult's, he/she finds the error and modifies it so that his/her own grammar matches that of the adult's. According to Foss and Hakes (1978), children internalize the target language rules through a 'subconscious" process (p. 123). However, believing that language ability is innate in humans, the theory states that there are restrictions imposed by the innate linguistic universals on the kinds of hypothesis children may form. All children form the same hypotheses because of these restrictions.

3.3. Creativity and innovation

A normal human being can go through life without having learned to read or write. Millions of people in the world today prove this. However, these same millions all speak and understand and can discuss complex and abstract ideas as well as literate speakers can. Thus learning a language and learning to read are somehow different. Similarly, millions of humans grow to maturity without ever having learned algebra or chemistry or how to use a typewriter. They must in some sense be taught these skills or systems, but they do not have to be taught to walk or talk. In this vein, Gleitman (1993) argues that language learning is largely "from the inside out" rather than being "outside in" (p.28).

From the beginning, universally, children creatively confront the acquisition of words and sentence meanings. For instance, one of the subjects in the present study, Sina (2;1), was observed to use [nini] for a male baby and [jiji] for a female one. Another subject, Vania (3;6) was noticed to use [tu:t farangie bozorg] "big strawberry" for [hendeva:neh] "watermelon". The above examples indicate that what may look like deformation in the children's early productions, and in their early word meanings, could actually indicate the children's linguistic creativity and competence.

Lust (2006) believes that although specific innovations in the child's first words may be "illegal" in specific contexts, denominalizations are required in general in English and across languages. Such "lexical innovation" persists to adolescence as well as adulthood. In Table 4 some examples of early creativity in lexicon are illustrated.

Table 4
Early creativity in the lexicon (Clark 1982)

Locatum verbs	**Instrument verbs**
Mummy trousers me (2;3)	You have to scale it first (2;4)
Pillow me (2;6) [in pillow fight]	Don't broom my mess (2;11)

At more advanced levels of language acquisition, we could imagine plenty of innovations on behalf of children. For instance, children employ a large number of innovative strategies to get themselves across, to make a step forward and/or to refuse to do something which is not so desirable.

The children use of speech act of refusal can provide us with a good example. My nephew, Mohammad, who is 7;2 presently, was jokingly asked by people of different ages to give them some of his yummy raisins when he was around 4;00. However, the child's diverse responses to the people's requests were of extreme interest. Here is what happened between him and other interlocutors:

Cousin (9;00): [mohamad, yekam keshmesh be man bedeh] "Mohammad, give me some raisins."

Mohammad: [xoshmaze ni:st] "That's not tasty."

Aunt (32;00): [mohamad, yekam keshmesh be man mi:di:]"Mohammad, would you give me some raisins? "

Mohammad: [zia:d ni:st] "That's not much enough."

Grandmother (60;00): [mohamad, yekam az keshmeshat be man bedeh] "Mohammad, give me some of your raisins. "
Mohammad: [bara:t xu:b ni:st] "That's not good for you."

It is almost self-evident that the child is adopting different strategies for refusing what seems undesirable to him. An interesting point is the diversity of the child's responses provided for different interlocutors, proportionate to their ages and familial/social status.

The child's involvement with ironic contexts could be of interest in its own turn, and his/her reaction(s) to the ambiguous contexts is worth studying. In one occasion, the same subject, Mohammad (being 4;6) visited me in my workroom, while I was working with my computer. He was eagerly feeling to have some fun with the computer games in my computer. However, he felt disinclined to raise the matter directly. Instead, he appealed to some woolly statements to express his intention circuitously:

Mohammad: [mibinam keh ye ka:mpioter da:ri:] "I see you've got a computer."
Uncle: [bale] "Yes."
Mohammad: [ka:mpiotere khu:bie] "Yours is a good one."
Uncle: [bad ni:st] "Not bad."
Mohammad: [faqat ba:sh na:meh mi:nevi:si:] "Do you just type with it?"
Uncle: [taqriban] "almost always."
Mohammad: [ba:zi ham da:re] "Does it have any games in it?"
Uncle: [nemi:du:nam ke chi:] "I'm not sure. So what?"
Mohammad: .....
Uncle: .....

The above examples, clearly illustrate creativity and innovation on behalf of a Persian child (around four-year-old), who was gradually developing his syntactic, semantic, and socio-cognitive skills and abilities in language.

Still, at more advanced levels of language acquisition, we could imagine plenty of morphologic creativity on behalf of children. For the most part, productive devices in this process are typically the first to be acquired. In such occasion, when there is more than one form to convey a specific meaning, the one most frequently used is acquired first and in many cases is even overgeneralized. For instance, the suffix -GAR in Persian is applied to derive agent nouns like [zargar] "goldsmith", [a:hangar], "blacksmith" and [ka:rgar] "worker". A child who has acquired this productive marker tends to apply it to words like [nanva] "baker", [baqqal]"grocer", and [barbar]"porter" which do not allow the application of -GAR (examples 1,2, and 3 below). We see the same case in English where the word "thief" pre-empts the creation of "stealer" (Clark 1981).

1. *nanva-GAR
   baker-AGENT
2. *baqqal-GAR
   grocer-AGENT

3. *barbar-GAR
porter-AGENT

In (1), (2), and (3) there is the overgeneralization of -GAR in nouns which already refer to people of three various occupations.

In other cases, we could even observe the production of genuine innovations by children by means of the suffix -GAR, and although the child's innovation seems "illegitimate" (Clark 1981) in some cases, it obeys the rule of suffixation for -GAR. In fact, this innovative agent noun is a poof that the child has mastered the –GAR marker as a separate morpheme. Moreover, he/she knows how to attach this marker to the nominal stem. In line with this logical reasoning, the child creates a new word which is unfortunately pre-empted in adult speech. The occurrence of the words [si:mgar] “electrician” and [noqregar] “silversmith” where-GAR is suffixed to a word referring to the professions via [si:mgar] and [noqrega:r] rather than to the items [barqka:r] and [noqreka:r] dealt with in the professions illustrates two more examples.

4. *simgar (one who deals with electricity)
electricity-AGENT
“electrician”

5. *noqregar (one who deals with silver)
silver-AGENT
“silversmith”

4. Discussion

It goes without saying that children do not wake up one morning with a fully formed grammar in their heads or with all rules of social and communicative interaction. Language is acquired through stages. Some linguists divide these stages into pre-linguistic and linguistic stages.

Regarding analytic style vs. gestalt style of language learning, some of the children who participated in the present study showed more tendencies toward gestalt style of language acquisition (e.g., Samsam, Atena, and Vania), while some other subjects had more tendencies toward analytic style of Persian acquisition (e.g., Sina, Behnad, and Mohana). Interestingly enough, one of the subjects (Roza) proved to have a strong tendency toward a combination of both approaches from the very beginning of her language acquisition.

Considering the findings of the present study, for the most part, naturalistic sampling like what we did in the present study is generally considered the ideal method for studying child language. However, it does have certain limitations. First, the samples could be informative about speech production, but they most often give little information about speech comprehension. Second, samples, by their very nature do not contain everything, as our samples did not, and it was the reason we preferred to study some subjects simultaneously rather than suffice to only one. The samples can easily miss some important features of a child’s linguistic ability

or may not provide enough examples of a developing language feature for the researcher to make a decision about the way a child is acquiring that feature.

The acquisition of the first language, however, indicates some similarities across children at a general cognitive level. All children cry, coo, babble, and produce words. They perceive certain phonetic distinctions categorically and use the same phonological process of reduplication, assimilation & reduction. Another innate aspect of language is the time of acquisition, which typically starts from 2 years and continues up to adolescence. Also, assuming LAD in children, it would require input to become activated. In syntax, children make progression from one word to two words, and then more words. They initially produce the same cases across languages, and reproduce the most frequent forms of the adult language, and later increase attention to less frequent constructions in language. There are also similarities in sequence among children which constitute innate language mechanism and general cognitive changes coordinated with similar real world environments. In other words, children learn a sentence construction, past tense, negation or causality only when they understand the underlying real word situation.

5. Conclusion

When children learn a language, they learn the grammar of that language, the phonological, morphological, syntactic and semantic rules. No one teaches them these rules, children seem just to 'pick them up' and in so efficient a manner as to suggest that children are apparently 'pre-programmed' to learn language. This innate capacity is a gift from God. It enables children to analyze the language of their environment and to create and refine their own grammar until they can understand and produce the full range of utterances which adults can produce.

Obviously, what impels the child to "improve" his/her speech remains largely something of a mystery. We cannot take "improve" simply to mean "bring into closer approximation to the speech of older persons around the child." The child language improvement is definitely a response to selection pressures of various kinds in which ill-formed or incomplete utterances are typically less effective than well-formed and complete utterances in accomplishing the child's intent. In this process parents probably approve of well-formed utterances and disapprove or correct the ill-formed. These ideas sound sensible and may be correct but there is still scarce evidence available to support them sturdily.

At the holophrastic stage the point was made that the child's constructions are characterized by a seemingly lawless optional omission of every sort of major constituent including subjects, objects, verbs, locatives, and so on. The point was also made that omission seldom seem to impede communication, since parents, being in the same situation and familiar with the child's stock of knowledge, understand correctly so far as one could tell, even the incomplete utterance. The implication was made that the Stage I child's speech is fairly well- adapted to his/her purposes, but as a speaker, he/she is very hardly personalized. For example, we guess that while speaking to strangers the child would have to learn to express obligatory

constituents if he/she wants to get his/her message across. The above point indicates that the selection pressures to communicate may operate chiefly *outside* our sampling situation, which is typically the child at home with family members.

In sum, we do not presently have enough evidence that there are selection pressures of any kind operating on children to impel them to bring their speech into line with adult models. It is, however, entirely possible that such pressures do operate in situations unlike the situations we have sampled, for instance, away from home or with strangers. It is also possible that one should look more closely at the small number of child utterances which turn up in most samples where the adult just does not seem to be able to make out what the child means. A radically different possibility is that children work out rules for the speech they hear, passing from levels of lesser to greater complexity, simply because the human species is programmed at a certain period in its life to operate in this fashion on linguistic input. Linguistic input would be defined by the universal properties of language. And the period of progressive rule extraction would correspond to Lenneberg's (1967) proposed "critical period." It may be chiefly adults who learn a new language in terms of selection pressures. Comparison of the kinds of errors made by adult second-language learners of English with the kinds made by child first-language learners of English could be enlightening.

The findings of this study support Clark's argument that creativity in children's speech results from the need of finding an acceptable word to fill a gap in the lexicon (1981). Moreover, as Lust (2006) puts it, children seem to rely on their creative theory construction as a compensatory tool and productive device to create new words. They generally acquire the most productive word first and then apply it:

a. in place of other less productive words that serve the same function;

b. in creating new words on the basis of rules which are not applied in adult speech either because an element different from the generally practiced one is employed, or because markers used in these creations are the least productive ones.

On the other hand, the innovations that do not conform to the adult forms indicate that children:

a. have not learned the less productive suffixes that convey the same meaning;

b. have not learned the exceptions to the rules;

c. tend to convey the message from their own perspectives and to encode the events accordingly.

In the end, it should be noted that in the present study the acquisition of Persian as a first language is investigated through the lens of creativity in the children's speech, and certainly further studies on other aspects of the acquisition of Persian as the first language can be conducted. For instance, the effects of individual differences and children’s cognitive style, temperament, and social environment on their language development and creativity can be explored. In this vein, considering Vygotsky’s Zone of proximal development (ZPD) theory, the role of social interaction with

caregivers, siblings, and peers influence on children's language development and creativity can also be investigated. Moreover, the role of linguistic input (e.g., frequency, complexity, diversity) which children receive, and the way(s) this input can shape their language development can be examined.

Last by not least, the findings presented in this study are by and large based on personal interpretations resulting from the analysis of the collected data from a limited number of subjects. Thus, the small sample selected in the current study should be acknowledged as a main limitation of the study. In addition, in conducting such studies as the current longitudinal observations, there is a potential room for researcher bias that has to be taken care of. In order to arrive at broader generalizations, more supporting evidence from related studies on larger population of children is needed. The results of such studies could definitely be of interest in their own turn.

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Appendix I

The phonological transcription used throughout the study

Consonant Sound (Persian)	Transcription (English)	Sound Description
ب	[b]	voiced bilabial stop
پ	[p]	voiceless bilabial stop
ت	[t]	voiceless alveolar stop
ط	[t]	voiceless ‘emphatic’ alveolar stop
د	[d]	voiced alveolar stop
ض	[z]	voiced ‘emphatic’ alveolar fricative
ک	[k]	voiceless velar stop
گ	[g]	voiced velar stop
ق	[q]	voiceless uvular stop
ء	[?]	glottal stop
ج	[j]	voiced palato-alveolar affricate
چ	[ch]	voiceless palato-alveolar affricate
ع	[‘]	voiced pharyngeal fricative
ف	[f]	voiceless labiodental fricative
ث	[s]	voiceless dental fricative
ذ	[z]	voiced dental fricative
ظ	[z]	voiced ‘emphatic’ dental fricative
س	[s]	voiceless alveolar fricative
ص	[s]	voiceless ‘emphatic’ alveolar fricative
ز	[z]	voiced alveolar fricative
ژ	[zh]	voiceless alveolar fricative
ش	[sh]	voiceless alveolar fricative
خ	[x]	voiceless uvular fricative
غ	[gh]	voiced uvular fricative
ح	[h]	voiceless pharyngeal fricative
ه	[h]	voiceless laryngeal fricative
ر	[r]	alveolar trill
ل	[l]	lateral alveolar
م	[m]	bilabial nasal
ن	[n]	alveolar nasal
و	[w]	bilabial approximant
ی	[y]	palatal approximate
ك	[k]	voiceless palato-alveolar
ق	[gh]	voiced velar stop

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Abstract

Language translates emotions, thoughts, and ideas. Linguists have long delved into how little ones learn their native language through diverse theories and perspectives, such as behavioral, cognitive, and nativist theories. This study, however, takes a unique perspective, seeking to understand how and why children learn and acquire their first language by examining child language acquisition through the lens of three major theories— Innate Theory, Behaviorist Theory, and Cognitive Development Theory. The study adopts a qualitative design, it assesses secondary data from earlier research via a thematic examination. Innate Theory considers the Language Acquisition Device as an inborn biological mechanism for language learning purposes. However, this study suggests that Willpower is what gets the LAD running. In contrast, Behaviorist Theory heavily focuses on the effects of outside influences on language learning. This paper contends that Willpower is necessary to prompt the child to respond with inhibitory control and, therefore, counteract the facilitation of performance that would otherwise follow from stimulus-response learning relationships between motivating and nonmotivating stimuli. Furthermore, the stages of language development by a child are explained, including how Piaget represented his Cognitive Development Theory. This study shows that strong Willpower gives children the emotional resilience to concentrate for a more extended period and use their brain power in learning a language. Moreover, this study provides an insightful understanding of Willpower and how it directs individuals to set realistic goals and helps one self-regulate in language acquisition — essential conduct for young learners to develop this motivation later.

Keywords: willpower, child language acquisition, innate theory, behaviorist theory, cognitive development theory

1. Introduction

Humans have found many ways to communicate; they even began telling stories and sharing their emotions and thoughts during the Gravettian Period of Humanity. Through the years, how children acquire language has been a significant area in linguistics, with scholars presenting different ideas to account for this process. Over the years, linguists have explored how children learn their first language in terms of behavioral, cognitive, and

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nativist approaches, and each provides food for thought regarding the mechanisms of language acquisition that could be understood. These viewpoints suggest that language learning results from the interaction of innateness, experience, and cognitive development. Three of the most famous contributors to this debate - and the field broadly understood are Noam Chomsky, B.F. Skinner and Jean Piaget, each with a unique take on how children learn language.

In his 1957 book Syntactic Structures, the linguistic hero Noam Chomsky transformed the linguistics field with his theory of Universal Grammar. One of the concepts that are in line with what the nativists see is that kids have an adroitness based on their birth to learn a language, and Chomsky, another list of its significant exponents, argued this. In contrast, in Verbal Behavior (Skinner, 1957), B.F. Skinner advocated for a behaviorist viewpoint, saying that language was learned by children behaving in their surroundings and being rewarded. Jean Piaget and his colleague Bärbel Inhelder, in The Psychology of the Child (Piaget & Inhelder, 2008), argued for a cognitive-developmental view proposing that language acquisition is integrally tied to a child's cognitive development. These have helped us immensely in understanding the complex process of how children learn language.

While traditional language acquisition theories emphasize biological predispositions, environmental reinforcement, and cognitive development, they often overlook an essential factor: *willpower*. This intrinsic drive to communicate and engage with language, defined as willpower, plays a crucial role in the learning process, surpassing the influence of biological, environmental, or cognitive factors alone. By incorporating willpower into the understanding of language acquisition, we see children as active agents in their development rather than passive recipients of external stimuli or innate abilities. This study reinterprets the theories of Chomsky, Skinner, and Piaget through the lens of willpower, offering a more comprehensive understanding of how children acquire language and consciously choose to use it for communication and self-expression. Recognizing the role of willpower in language learning enriches existing theoretical frameworks and has important practical implications for education, particularly in developing strategies that foster motivation and perseverance in young learners.

1.1. Theoretical Framework

1.1.1. Willpower and Child Language Acquisition

Willpower is the capability to postpone instant thrill or short-term intentions so that individuals can work towards long-run aims, and it very much affects how individuals cognitively and emotionally thrive at language learning. It depends on cognitive development, environmental input, and willpower's psychological resources. The present theoretical framework aims to account for the role that willpower plays in child language learning, drawing on different psychological perspectives, ideas from decision theory, and a set of assumptions about what humans are likely to want. This framework helps us examine the effect of willpower on persistence, emotional regulation, and social dynamics in the context of language learning (Ainslie, 2021. Baumeister & Vohs, 2007).

Willpower is regarded as an intrinsic component of the broader cognitive-affective processing system**,** wherein cognitive and emotional mechanisms interact to shape behavior (Mischel et al., 2004). It involves the activation of cognitive attention strategies and cooling mechanisms to regulate impulses and sustain goal-directed behavior (Mischel & Ayduk, 2002; Mischel et al., 1996). Notably, willpower can also be considered a critical determinant in a child's first language acquisition. Language acquisition parallels the process of acquiring any other skill (Chater & Christiansen, 2018). While language can be acquired throughout an individual's lifetime, the early infancy period serves as the critical window for first language acquisition, as it is during this time that infants are exposed to linguistic input and environmental stimuli. In this stage, they reach significant milestones in language development, integrating behavioral, neural, cognitive, and evolutionary processes (Gervain & Mehler, 2010).

Children tend to observe their surroundings and the individuals in their environment, which fosters their will to express emotions and thoughts. This aligns with the fact that desire, emotion, and social norms are key components of how children learn about language (Lagattuta, 2005) or how they engage in social interactions. One aspect of willpower is controlling or directing emotions — for frustration or impatience. Children who can regulate their emotions remain strong and motivated. Additionally, a child must actively use the target language to communicate emotions, ideas, and needs. Here, willpower functions as a catalyst**,** propelling the infant from merely possessing an idea to actively verbalizing it (Bakat, 2023). However, children often encounter natural obstacles in language acquisition, such as unfamiliar vocabulary and complex sentence structures (Barman, 2012). These challenges may lead to disengagement or reluctance in communicative interactions. Since willpower is both a cognitive and emotional phenomenon, it activates cognitive attention strategies and cooling mechanisms (Mischel & Ayduk, 2002; Mischel et al., 1996). When a child faces linguistic difficulties, the filtering function of willpower helps mitigate frustration, reducing reluctance and reinforcing perseverance in the pursuit of communication.

Moreover, a child's willpower determines their active participation in conversations and structured dialogues (Clark, 2002). When a child will actively engage in social interaction and joint activities, he will develop linguistic competence (Pemberton, 2024). This, language development provides children with resources to exercise emotional regulation due in part to their capacity to put feelings into words negotiate the social world, and manage conflict (Cole, Armstrong, and Pemberton, 2010). Later on, when a child notices that, he has been able to share his emotions and thoughts more clearly due to the language used, he will tend to communicate. This communication, driven by a child's will, facilitates emotional and cognitive development, significantly enhancing acquisition rates. In this sense, willpower can be a fundamental mechanism supporting children in overcoming cognitive and emotional barriers—an essential element in language acquisition.

Loewenstein's (2000) model is therefore well suited from an economic viewpoint, because it interprets, how children can act rationally and trade short-run costs off against long-run benefits in learning a language. Willpower

is what empowers children to balance the scales between immediate costs and benefits so that they are more likely to keep on engaging with learning — even when they have to put up with little in terms of immediately getting rewards such as 'I now understand this word instantly.' Research by Willis (2020) showcases that, young language learners use something called an 'executor' and the more information they can store in this memory-saver, the more their persistence as willpower becomes important. Kids who push through those early language cork-stoppers are far more likely to end up fluent and excellent — in the long run.

A study by Yu and Chua (2024) adds a further salient lack of will to the child language learner's storyline, and their beliefs about free will. Children with a high dispositional level of control are more inclined to combat complex tasks like learning a language. This sense of agency is closely linked to willpower, giving the child that experience of being able to keep going through frustrating times only because he knows his efforts eventually pay off. Some take it even further, with Roberts (2020) arguing that willpower contributes substantially to toddlers' success in learning language. Even studious children who have had time to pour over their studies will be able to develop better language skills and fluency.

Social and cultural influences play a pivotal role in the learning of language too. A study by Z. Lili (2015) highlighted that ethnic minority students need more than just willpower; they also need non-intellectual forces to be able to succeed in school especially when learning conditions may not support their academic achievement. This underscores the need for a holistic approach to language learning, considering not just individual willpower but also the external factors that can support or hinder it. Additionally, Storch and Whitehurst (2015) showed for written language acquisition, family support is one of those external factors, along with school environments — willpower cannot be thought of separately from individual-endogenous or exogenous resources. Willpower in children affects how easily a child learns to make his or her desires felt through language.

The capacity for deferred gratification, a primary component of willpower, is deeply relevant to language learning. The classic research on delayed gratification (Mischel, Shoda & Rodriguez, 1989) has shown that cognitive competencies - the ability to forgo immediate rewards in the service of longer-term benefits - predict higher academic and social performance. This translates quite literally to the learning of language, as children must push against their inclination to speak in short sentences and use easy words to learn how to use both more complex structures. In this understanding of willpower presented by West (2021), resolve is a powerful tool utilized to mobilize individuals toward substantive ends, for example reaching competency in a language after an unsavory succession of focus and labor. The appreciation of deferred gratification in language learning is crucial for educators and researchers to understand and promote.

2. Methodology

Donald states that qualitative research is an ‘a family of methods which use direct language data’ (Donald, 2005, p. 137), so you can think of it in terms of a spectrum including Surveys and Interviews on the one hand, then

Focus Groups, Observational Methods and Ethnographic Techniques at around the mid-point between two extremes defined by something structured like an experiment on one side versus complete discovery-by-immersion in new territory like heuristic inquiry or future scenarios research on the other method. This study utilizes a qualitative paradigm to enable the researcher to identify core themes and reasons offered by the sample (Braun & Clarke, 2006). Qualitative data not only have the merits of following the context—driven rationale but also provide a detailed description of how development programs work and what elements within a program are "worthy" (Mertens, 1993), making them a valuable tool for investigating such complex phenomena without constraints (Denzin & Lincoln, 1994).

This study followed a systematic review of the scholarly literature, which means relying on secondary data. The researcher was prompted to select sources based on their relevance to Willpower and its theoretical significance within Chomsky's Innate Theory, Skinner's Behaviorist Theory, and Piaget's Cognitive Development Theory. Only credible peer-reviewed journal articles, academics, books, and theoretical research were included, yielding 45 studies for analysis. Thematic analysis was employed to examine the data, as it offers a structured yet flexible approach to identifying latent patterns in theoretical discourse (Boyatzis, 1998). Following Braun & Clarke's (2006) six-step thematic process**,** the study distilled its findings into three core themes: Willpower as an Activator of Innate Language Ability, Willpower as a Filter for Reinforcement in Language Learning, and Willpower as the Engine of Cognitive Language Growth. This study only followed A qualitative theory-driven methodology, providing a comprehensive and nuanced evaluation of the role of Willpower within established linguistic frameworks. The study adds depth to the research methodology by creating an extraordinarily nuanced and detailed understanding of the relationship between Willpower and Child Language Acquisition.

3. Findings

3.1. Willpower as an Activator of Innate Language Ability

The Innateness Hypothesis, originated by Noam Chomsky, has ruled much of the study of language acquisition. It is this theory that the process of acquiring language is pre-programmed into humans with biological structures called the Language Acquisition Device (LAD) and Universal Grammar (UG). Chomsky claimed that children acquire knowledge of language quite quickly because they have an inborn capability to learn from the data available to them. The UG, for example, suggests that some core linguistic principles are inborn and allow children to create sentences they have not been exposed to (Chomsky, 1959; Chomsky, 2014). Namely, the idea that kids are born ready to handle the complexity of human languages is all but taken as a given for linguists — supported by such things as the "poverty of stimulus" phenomenon. This study interprets this challenge as suggesting that the linguistic input children hear is not enough to explain their quick and sophisticated language development (Goldberg, 2008). However, while insightful, Chomsky fails to highlight that learning a language is hard work. It talks about being biologically ready but not about the grit to push through and keep pushing. According to the LAD, it can give an underlying structure

— basic rules, but children must keep drilling on these rules with effort and motivation.

Willpower, a type of self-control that is essentially the psychological resilience to resist immediate temptations and achieve long-term projects, plays a crucial role in second language learning (Baumeister & Vohs, 2007). Despite possessing an innate ability for language according to Chomsky's theory, children need a large amount of grit to conquer linguistic obstacles like irregular verbs or when dealing with complex syntax and more abstract grammar rules. Encouraging resilience is vital in facing challenges with determination to push on through the hard times, especially when it seems that progress has slowed (Wout and Jarrold 2020). For example, learning the correct forms of irregular verbs is a task that demands multiple acts of performance so naturally cognitive readiness and both cognitive and motivational encouragement can be postulated as important variables (Dłużewska-Owczarek & Kaźmierczak, 2020). Therefore, although Chomsky's perspective on language acquisition elucidates the biological component of what drives us to learn language, willpower helps fill in a unique gap in this narrative by explaining how children can continue their pursuit, empowering them to overcome linguistic challenges.

Willpower helps children to use their cognitive abilities consistently and for long periods. In addition to cognitive function, willpower also impacts emotional resilience, another crucial component of language learning. For example, children often find Orisinal frustrating because of the challenging linguistic features that require them to learn passive voice and complex phonological distinctions. In these cases, willpower helps children deal with their initial emotions and try again — despite failing. Emotional resilience, associated with high willpower, is conducive not only to language learning but also to lifelong learning (Dłużewska-Owczarek & Kaźmierczak, 2020). Furthermore, Lenneberg (1967) pointed out the supporting role of motivational factors like the child's will to enable them to reach their maximum cognitive and linguistic potential. Integrating willpower into the model of Chomsky, this study gets a better model of how language acquisition works since biological predispositions alone are not enough, children also need motivation to practice and become good at. This emphasis on the role of willpower in maintaining emotional resilience encourages the audience and instills a sense of determination in them.

Indeed, in the domain of willpower itself, it powers a child's native disposition to motivate him or her to employ cognitive systems like the LAD. Additionally, the need to learn a language is one of those forces that are capable of mobilizing us to overcome all kinds of difficulties. The consistent trouble children have in accomplishing the finer points of phonetic discrimination, quirks in grammar learning, and the acquisition of conversational language use provide such instances. Even the LAD framework, for instance, may be undermined by insufficient willpower and end in frustration or disengagement in learning (Wout & Jarrold, 2020). This implies that willpower triggers not only cognitive processes but maintains children excited and motivated during the trajectory of their language learning. This stress on the role of willpower in maintaining excitement and

motivation during the language-learning process keeps the audience engaged and enthusiastic about the topic.

The incorporation of willpower adds more depth to Chomsky's theory, and the child language acquisition process was described in contemporary studies. Although Chomsky explains the biological and cognitive underpinnings of learning language, he fails to consider the individual agency needed to overcome difficulty. Recognizing the contribution of willpower gives further insight into how children work with language, helping them come to terms with what it may take to acquire another language. This unified model gives a broader picture of language development, combining cognitive and biological triggers and the motivated effort for linguistic gain on the child's side.

3.2. Willpower as a Filter of Reinforcement in Language Learning

Operant conditioning, and therefore, B. F. Skinner maintains that human language comes about based on the response of behavior by way of positive reinforcement as well as imitation. Skinner's theory is based on the idea that behavior can be learned by linking actions with their consequences, primarily through rewards and punishments (Araiba & Sho, 2019). From this perspective, children learn language through mimicry, rewards, and practice (Skinner, 1957). Children imitate the sounds of adults, and when they are rewarded for their efforts by praise or notice, they tend to try similarly doing things again. With time, these successful attempts become habit word formation and the basis of learning a new language (Skinner, 1938). Skinner's behaviorism model relies heavily on external stimuli to shape behaviors, including the evolution of language. Constant reinforcement of language skills and the reality that they must use their words to obtain desired objects at school or home both provide a consistent, reliable external force affecting how well a child communicates. This process focuses only on what observable behaviors are illustrated and does not include any weight placed on internal cognitive processes or motivation (McLeod, 2018). Repetition and positive reinforcement of a child's babbles also allow the child to master language structures gradually using a trial-and-error process. Although the model outlines a practical logic of how reinforcement shapes language acquisition, it has also been argued that the frame appears to be incomplete as external forces such as goals, intentions, and desires seem to be only partially treated in their understanding. Skinner's theory, for instance, cannot account for why some children come into the world wired to imitate language with little or no reinforcing input. According to Krishnan (2022), children use communicative strategies in social situations and are driven by an intrinsic motivation to interact, regardless of immediate rewards. To this point, Nufus and Kuhl (2011) argue that as infants learn language, in general, life events help drive learning, and even before these occur, they are predisposed to be conversation partners.

This becomes particularly important within tasks of difficulty when considered in child language acquisition and relates to their capacity to deploy top-down control. Although Skinner neglects the significance of willpower, his model is consistent with the enduring nature of children's language learning efforts. Their trial-and-error experimentation in learning to communicate is a sign that willpower is what propels them despite little external reinforcement

(Smith et al, 1958). A follow-up study by Berko and Brown (1958) found that children derive pleasure from successfully communicating, leading them to explore the world of language further. Skinner emphasizes the role of imitation and reinforcement and underestimates children's subsequent tenacity in the face of failure. This suggests that language learning is more than just imitating behavior to avoid reinforcing reinforcements — it also involves cognitive, motivational state analytics (McLaughlin, 2010).

Such a development allows behaviorism to account for language learning much more satisfactorily, and the concept of willpower is involved in such an account. External rewards matter, but children are inherently motivated to talk to others. Nyamapfene (2009) similarly argued that the underlying intentions children express in communication draw on both social and interior factors; language learning encompasses a mediated combination of influences from outside sources and internal motivations. With no short-term reward for children, the internal resource of willpower sustains their effort in language examination. This broader perspective pushes a dichotomous understanding of the genesis of language development, that is, as a reaction to environmental stimulations (Dixon et al., 2011). According to Pascual (2011), external reinforcement is not powerful enough to elicit learning without intrinsic motivation. Those determined children are the ones who sputter and curse but still keep plugging away. Viewing willpower through the behaviorist framework shows how language is learned.

Skinner's behaviorist theory highlights the effect of external reinforcement in child language learning and how environmental stimuli can determine linguistic behaviors. However, it does not explain internal factors such as willpower or intrinsic motivation. By framing willpower within this behaviorist architecture, a complete account of child language development emerges, illustrating the role of perseverance, grit, and human nature in learning. While external reinforcement is essential, willpower continues to work on the language, helping children muscle through those times when it gets tough and they want to give up. From this study that includes a role for willpower, children are not just passive recipients of external reinforcement during the language acquisition process but also actively driven to acquire their native language by pushing themselves and resisting impulses.

3.3. Willpower as the Engine of Cognitive Language Growth

Children construct mental structures (Or Schemas) to process and store information, such as language, from the environment while developing (Piaget & Inhelder, 2008). These cognitive schemas grow or develop as they assimilate more linguistic input and accommodate this information into their pre-existing mental models (Bloom, 1998). Jean Piaget's Cognitive Development Theory posits that children progress through distinct stages of mental development: sensorimotor, preoperational, concrete operational, and formal operational. Piaget then pointed out the significance of symbolic thought in language learning. Symbolic thought, which also appears during the preoperational stage, allows children to use language to stand for things that are not present and moves communication beyond just reporting simple information (Pinker, 1989). Though Piaget's model emphasizes the role of cognitive maturity in unlocking language ability, it cannot explain why some

children perform better on language tasks than others with similar claims to age and anoxia (lack of damage/trauma). This study emphasizes the importance of willpower in the model of cognitive development.

Seeing willpower as a part of the cognitive development framework also emphasizes the role of intrinsic motivation in language learning. What can be described as organic curiosity — a child's internal motivation to investigate language for its own sake — is their intrinsic motivation. According to Hasanah (2011), from the very beginning, nature and purpose of children are eager to learn language or language activities motivated by a natural curiosity that assumes them as active and driven cognitive-active living, a state of being where the child is actively engaged in the process of learning and understanding. This involvement necessitates both mental energy and the tenacity necessary to overcome those obstacles associated with language acquisition (Compagnoni et al., 2020; Chow et al., 2015). This is evidenced by Piaget's notion of egocentric speech, whereby children ultimately use language for selfish purposes, to serve man rather than communicate with others (indeed serving exclusively the will). The impulse of the child to play with language is a manifestation of both his intellectual labor and individual initiative. This focus on the learner's active participation in language learning contrasts with methods of more passive conceptions, such as behaviorism and nativism, that place a minimal value on the agency of the child (Shormani, 2014). Consequently, willpower as part of intrinsic motivation, allows children to overcome immediate cognitive demands; for instance, to learn new words or grammatical structures).

The integration of willpower is essential for sustained cognitive engagement as children continue to develop through some stages. Language Acquisition involves the process extended in a set of stages throughout our childhood development and cannot be learned with one quick jolt of learning effort. Piaget was primarily concerned with cognitive development; thus, he did not adequately address the mental perseverance required to achieve language proficiency. Children who harness willpower are better equipped to engage in challenging cognitive tasks, such as mastering complex grammar, which Piaget's theory does not fully account for (Yu & Chua, 2024). Infusing willpower with Piaget's model of cognition, this study seeks to understand child language. Willpower enhances cognitive processes as the motor that keeps effort going over time (incredibly frustrating) when results are rare and the new learning curve is sharp. Consequently, willpower is not merely a secondary characteristic but a critical factor in achieving linguistic proficiency (Yu & Chua, 2024).

While Piaget's Cognitive Development Theory provides a framework for understanding the intellectual processes behind language fundamentals, it needs to adequately address the role of effort in cognitive development, particularly self-control. Willpower plays a significant role in the cognitive effort required to overcome the challenging aspects of language, which is essential for achieving fluency. Therefore, children who possess willpower are more likely to be able to sustain the necessary mental energy over time. By incorporating willpower into the cognitive development model, this research draws attention to the mediation of individually perceived readiness and

perseverance in language acquisition. This holistic approach offers a more comprehensive understanding of the actual process that children undergo in learning language, taking into account both cognitive development and the child's willpower for success. This emphasis on the role of willpower in overcoming cognitive challenges empowers children and makes them feel capable in their language learning journey.

4. Conclusion

In this paper, three main acquisition theories are reviewed and analyzed from the perspective of Willpower for a better understanding of Child Language Acquisition. The key findings are as follows:

Firstly, Chomsky's model provides valuable insights into the biological and cognitive aspects of language learning through the concept of the Language Acquisition Device (LAD); it neglects the role of individual determination in overcoming challenges. The current paper makes the case that willpower is a necessary and sufficient function to activate the LAD. Without the determination to process and refine linguistic structures, innate mechanisms remain dormant. Lenneberg (1967) similarly emphasized that biological potential alone is insufficient—a child must persist in overcoming linguistic challenges to utilize the LAD fully.

Secondly, The Behaviorist Theory of Skinner underscores external reinforcement and environmental stimuli in generating language behaviors. Instead, this paper aims to show that an individual is motivated to act in response to these stimuli by the mechanism of willpower. Here the mechanism means both cognitive and emotional processes will interact together to influence behavior (Mischel et al., 2004). Encouraging the child to act as a mediator by prompting them to respond to stimuli, thereby engaging in social interactions and joint activities. As this will further develop the linguistic competence of a child (Pemberton, 2024), effective learning can only take place with this reaction.

Lastly, Piaget's Cognitive Development Theory offers a ladder to how children learn language. The arguments in this paper suggest that willpower is necessary for maintaining cognitive effort and committing to long-term language development. To explain it further, children always have a natural curiosity to learn language or language activities (Hasanah, 2011]. While engaging in language-related tasks, a child can face situations where the language or language activity is beyond his cognitive level. Here willpower can act as a cooling mechanism (Mischel & Ayduk, 2002; Mischel et al., 1996), or even as an engine. If the engine gets on, the child is more likely to internalize complex linguistic structures, thereby accelerating cognitive and linguistic development beyond their immediate proficiency level.

By integrating willpower into the existing models of language acquisition, this perspective offers a more comprehensive understanding of child development. Theories traditionally centered on biological or environmental influences gain greater depth when viewed through the lens of willpower. This enriched academic discourse is also practically relevant for educational practices, especially in improving resilience, self-regulation, and goal-setting in young language learners.

5. Recommendations

Based on the key findings and discussion of the study, several recommendations can be given

Firstly, subsequent research should examine children's cognitive and linguistic maturation in conjunction with the emergence of willpower. Research in this area could explore critical periods of language development when self-regulation plays a powerful role.

Secondly, Future research should conduct more empirical studies on interventions to enhance willpower in learners of L2. For instance, research could be conducted in experimental designs that involve the application of self-regulation techniques like mindfulness to see their effects on persistence and language learning outcomes.

Lastly, language is learned and taught in very different linguistic, and even more importantly - cultural contexts cross-cultural studies are important to determine why some educational interventions seem more successful than others in developing a "growth" mindset towards language learning with perseverance. This is particularly important in multilingual contexts when learning more than one language at the same time means more effort and need for motivation.

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The acquisition of pharyngeals by Arabic-English bilingual and monolingual Arabic children: A case study

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Abstract

This study investigates and compares the acquisition of pharyngeal consonants /ħ/ and the /ʕ/, which are part of the guttural consonants in Arabic, by Arabic-English bilingual children and Arabic monolingual children based on a case study of two children. The study also looks at claims made by researchers regarding the order of acquiring these sounds. The study was conducted by collecting speech samples from two children: one is monolingual in Arabic, and the other is an English-Arabic bilingual child. Data were collected using the free speech method and picture naming while recording the children as they were speaking. The analysis of the recordings is focused on whether the child can pronounce these pharyngeals or not and compares the two cases, the monolingual and the bilingual. The results of the study show that phonological complexity does not play a big role in the acquisition of these sounds, as claimed by Jakobson (1968). Moreover, the findings of this study also show that bilingual children acquire pharyngeals later than monolingual children despite the fact that these sounds are common in Arabic and have a high functional load.

Keywords: first language acquisition, child language, linguistics, phonology, phonetics, acquisition of pharyngeals

1. Introduction

Child language acquisition is one of the most significant areas in linguistics as it allows us to understand more about how humans learn and develop the intricate skills involved in language. This field encompasses various research domains, such as the acquisition of speech sounds, phonology, syntax, and semantics. This paper will focus on the acquisition of speech sounds, specifically the pharyngeals /ħ/ and /ʕ/, by a bilingual Arabic-English child under the age of three and will compare it with the acquisition of the same sounds by a monolingual peer of similar age. The goal of this comparison is to determine whether the sequence of acquisition for these two sounds is similar in children who speak only Arabic as well as those who speak another language alongside Arabic. Moreover, the observations drawn from this comparison are valuable when analyzed alongside the insights provided by other scholars regarding the sequence of acquisition of these sounds.

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Pharyngeal sounds are not among the first sounds to be acquired by children despite the fact that they are common sounds in Arabic and have a high functional load. There are many views on the acquisition of pharyngeal sounds. For instance, Ingram's (1989) argues that the acquisition of sounds depends on the frequency of their occurrence and their functional load in the language. So, according to this claim, children would acquire these sounds and produce them accurately as long as they are getting a lot of input regardless of their age (Ingram, 1989). Moreover, Jakobson (1968) claimed that the acquisition of speech sounds is universal because the complexity of sounds plays a role in their acquisition. Additionally, Mashaqba et al. (2022) studied the acquisition of gutturals, and their results indicate that non-native speakers do not produce sufficient primary constriction in the posterior regions of the vocal tract when producing these sounds (Mashaqba et al, 2022). In contrast, findings from a study conducted by Mashaqba and Hadban (2024) indicate that by age six, children typically acquire the consonants /x/, /ħ/, /ʕ/, and /ʔ/. They also mention that when mispronouncing these sounds, children often substitute them with other guttural or non-guttural sounds. The study also observed patterns of guttural sound deletion, varying across different sounds and their positions within words. Generally, accuracy in producing these guttural sounds increased with age (Mashaqba and Hadban, 2024). Moreover, according to a study by Amayreh and Dyson (1998), there are three stages of the acquisition of consonants in Arabic: the early stage, the intermediate stage, and the late stage. The pharyngeal /ħ/ is in the intermediate stage, and it should be acquired between the age of 2-4, while the other pharyngeal /ʕ/ is a late acquisition consonant, and it is acquired after the age of 4 (Amayreh and Dyson, 1998). Bilingual language acquisition and pharyngeal sounds will be reviewed to consider what other researchers have said about their stage of acquisition, as well as the theories that were proposed about the acquisition of these two sounds. Then, the data and the results will be presented as detailed observations based on the subjects of this study on the acquisition of pharyngeal by an Arabic-English bilingual child and an Arabic monolingual child.

1.1. Scope of the study

This study compared the acquisition stages of the pharyngeal sounds /ħ/ and /ʕ/ by an Arabic monolingual child living in Iraq and an Arabic-English bilingual child living in the United States. The study used the case study technique, recording and filming the subjects after obtaining all the necessary ethical approvals. The phonetic analysis of the subjects' production of the pharyngeals was then presented.

1.2. Goals and needs for the study

The acquisition of pharyngeal sounds in Arabic was investigated, and this is necessary because it will help us better understand Arabic phonology and add more to the study of this field. Many of the studies that were done are about Indo-European languages. Still, not as many studies have been done on Arabic, not to mention the importance of the acquisition of

pharyngeals and how controversial these sounds are in Arabic. Moreover, many scholars have debated the stage of their acquisition by children.

The remainder of this research paper is organized as follows: section two is on the rationale for studying bilinguals, a section demonstrating the significance of examining language acquisition in bilingual children. Section three is an overview of pharyngeal sounds in Arabic, which includes details about pharyngeals, their definition, and their order of acquisition, according to various researchers. Section four explores the case study, where the subjects, methodology, and findings are presented. Section five presents the findings and the observation of the study, while in section 6 the discussion is presented. Section seven shows the implications and the relevance of this study to the field, and section eight is the conclusion.

1.3. Why study bilinguals

Most studies on phonological acquisition in Arabic-speaking children have focused on the acquisition or sequence of sounds (Ingram, 1989; Jakobson, 1968; Mashaqba et al., 2022; Mashaqba and Hadban, 2024), with few examining the comparison of guttural acquisition between monolingual and bilingual Arabic-speaking children. Bilingual children around the globe exhibit varying patterns in language acquisition, influenced by factors such as the timing of exposure to each language and the sociolinguistic contexts of their languages. These variations affect acquisition patterns, rates, and proficiency in each language (Paradis, 2007), so researching bilingual children's speech production provides insight into how they develop two separate yet interacting linguistic systems (Saadah, 2008-2009).

1.4. Bilingual language acquisition

There are two types of bilingualism: simultaneous and consecutive (Baker, 2011). Simultaneous bilinguals acquire two languages concurrently and become native speakers of both (Genesee, 2000). In contrast, consecutive bilinguals learn one language before the other; in this scenario, the child becomes a native speaker of the first language, which is typically the dominant one (De Houwer, 2009). The bilingual subject in this study was exposed to Arabic during the first six months of her life and then to both English and Arabic simultaneously, making it somewhat challenging to determine whether she is a simultaneous or consecutive bilingual. This uncertainty arises from not knowing how much Arabic input she received during those first six months or whether that input influenced her language acquisition. However, she is categorized as a consecutive bilingual since she was monolingual for the first six months of her life. The monolingual subject, on the other hand, is exposed to Arabic only from birth.

Bilingual language acquisition is fascinating because children develop two linguistic systems simultaneously, while their monolingual peers develop only one. They typically do not receive equal amounts of input in both languages, and occasionally, one language becomes more proficient or dominant than the other. This explains why some bilingual individuals acquire their languages at a different pace compared to their monolingual peers (Paradis, 2007). The literature generally agrees that bilingual children learning more than one language do not need to exert twice the effort as

their monolingual peers; it does not require them more time than children learning a single language (Paradis, 2007). For example, Fabian-Smith and Barlow (2010) indicated that bilingual children establish two separate linguistic systems by the age of two (Keshavarez and Ingram, 2001; Meisel, 1989).

Furthermore, bilingual children can make language-specific categorical distinctions between the two languages they are learning. Additionally, Watson (1991) mentions that most bilingual children are unaware that they are engaging with two distinct linguistic systems until they reach the age of two, by which time they are nearly phonologically developed. In fact, the bilingual individual in this case study can differentiate between Arabic and English; when she speaks to her mother, she uses Arabic, and with her father, she uses only English. On one occasion, she was asked to relay to her father what she had said to her mother earlier, and she articulated her response in English.

1.5. Theories on the acquisition of phonetics and phonology

There are many theories in the literature about the acquisition of phonetics and phonology, such as the maturationalist theory of phonological acquisition and the NeoJakobsonian theory of phonological acquisition. These two theories are concerned with phonological acquisition in general (Shahin, 1994). According to the maturationalist theory, the articulatory difficulty determines the order of acquisition, that is, the harder the sound, the later it is acquired by children. Iraqi Arabic is a dialect with many hard sounds, and the pharyngeals, which are the core of our study, are two of these hard sounds. Evidence against this view was presented by Ingram and List (1987). For instance, Ingram (1989) said that the functional load of a certain phoneme determines the acquisition rather than the articulatory difficulty.

The other theory assumed is the NeoJakobsonian theory on phonological acquisition. Jakobson (1968) proposed this theory, as it is obvious from the name. He said that the phonological complexity of the acquired phonemes governs the acquisition of phonological contrast. According to this theory, the first words show linguistic organization and ambient language effects. In the beginning, children have phonological representations when they start to produce words, and then they acquire phonological features for these representations (Shahin, 1994). This theory enables us to find out the order of the acquisition of each phoneme depending on the complexity of the phoneme. For instance, the acquisition of the /b/, which exists in all of the languages of the world, is universal among all children no matter what language they are acquiring, but what about other sounds that do not exist in all of the languages of the world and their order of acquisition. Pharyngeals are an example of sounds that do not exist in all languages so we need to know the order of the acquisition of these sounds, which we cannot just guess by Jakobson's theory of the universality of the order of the acquisition since this theory also tells us that the order of the acquisition of speech sounds is universal and fixed because all the phonemes have the same qualities across all languages.

There are other theories that are concerned with bilingual language acquisition, such as acceleration, deceleration, and transfer. According to Fabian-Smith and Barlow (2010), these theories appeared in the areas of the acquisition of syntax and the acquisition of phonetics and phonology. Bilinguals develop two separate linguistic systems at the same time their monolingual peers are developing one linguistic system. Paradis and Genesee (1996) proposed a series of hypotheses about the way bilingual children acquire two linguistic systems. The hypotheses they proposed are acceleration, deceleration, and transfer.

Acceleration means that bilinguals show a faster rate of acquisition of certain linguistic features than their monolingual peers. Deceleration is when a bilingual child is delayed in acquiring certain linguistic features and shows a slower rate. It is hypothesized that the reason is that a feature in one of the two languages impedes the acquisition of the same feature in the other language. Transfer means that bilinguals transfer units or interact between the two languages (Fabian-Smith and Barlow, 2010). According to Fabian-Smith and Barlow (2010), deceleration has been accounted for in the literature in the area of phonological acquisition (e.g., Fabian-Smith, Goldstein, Gildersleeve, Davis, and Stubbe, 1996). Goldstein and Washington (2001) studied children acquiring English and Spanish and found that bilinguals are less accurate than monolinguals in some sound classes. Paradis (2007) also discusses whether bilinguals have two phonological systems or one mixed system. Some bilingual children lag behind monolinguals in their acquisition rates (Kehoe 2002, Kehoe, Lleo and Rakow 2004). They also display crossover effects from one phonological system to the other (Paradis, 2007). The next section includes an overview of the pharyngeal sounds, their nature, and their acquisition.

1.6. A preview of pharyngeals and their acquisition

As mentioned earlier, the stage of the acquisition of pharyngeals by Arabic-English bilingual children and Arabic monolingual children is investigated in this paper. The subjects are acquiring a dialect of Iraqi Arabic known as the Moslawi dialect spoken in the city of Mosul in the north of Iraq. There are two pharyngeal sounds, the /ħ/ and the /ʕ/, both are fricatives. The way these two sounds are produced by speakers is by narrowing the pharyngeal wall while letting air escape through the mouth. The /ħ/ is a voiceless pharyngeal fricative, and the /ʕ/ is a voiced pharyngeal fricative. According to Omar (1970), the occurrence rate of pharyngeals in Egyptian Arabic is 7.6%. This rate may not reflect the same occurrence rate of the same sounds in Iraqi Arabic since pharyngeals are very common in Iraqi Arabic. Pharyngeals are also common in baby talk or motherese in words such as /baʕija/, which means “any four-legged animal,”/ʕanʕan/, which means “car,” / ħuwwa/, /ʕamʕam/ which means “food,”/baħ/ which means “finished,” and /ʕaʕʕaa/ which means “I want to go potty.” These words are all proto-words, and they are used by children in the early stages of language acquisition as they are part of their earliest lexicon.

According to Al-Ani (1970), pharyngeals have distinct vertical places of articulation. Vertical place of articulation is "a set of anatomical locations from the palate to the glottis, inclusive," different from the horizontal, which is "from the lips to the uvula, inclusive." These sounds are very hard to investigate since the place and manner of articulation lie in the pharyngeal and laryngeal areas, so they are not as easy to access as the other sounds.

Concerning the acquisition of these sounds, the initial step in determining the stage of phonological acquisition is to understand the beginning and end of the acquisition process. In phonology, it is suggested that this process starts with the first words at around 6 to 12 months and concludes at approximately six years or older with the mastery of more difficult speech sounds. Some researchers argue that it actually begins at an earlier age when infants start cooing and babbling (Ingram, 1989). According to a study conducted by Omar in 1973, the pharyngeal fricative /ħ/ is typically acquired by the age of 3. Occasionally, it may be produced as the glottal fricative /h/, while the pharyngeal fricative /ʕ/, on the other hand, is acquired by the age of 4.5 years. Others, such as Amayreh and Dyson (1998), state that pharyngeals appear in the intermediate and late stages of acquiring Arabic consonants. Furthermore, Khattab (2007) notes that children have various phonological targets, which are not fixed. There are internal and external factors that influence this variability. For bilingual children, exposure may vary to different language varieties, including standard, non-standard, and non-native forms, which applies to both languages to which the child is exposed. On the other hand, Saleh, Shoeid, Hegazi, and Ali (2007) propose that there are three aspects of phonological development to examine: universal development, specific language development, and specific child development.

Amayreh and Dyson (1998) found that the acquisition of consonants falls into three stages: the early consonants (2 to 4 years), the intermediate consonants (4 to 6 years), and the late consonants (6 and up). According to this classification, the pharyngeals are in the intermediate and late acquisition. They also explain why some consonants are late in another study that they did about the completion of the phonemic inventories of Arabic, and they give two reasons for that. The first reason is that some consonants are variable and not yet produced because of the lack of input, so the input is important, and this, of course, supports Ingram's (1989) claim about the functional load. The second reason is simply that the sound is difficult, and this means that they support the other claim proposed by Jacobson about phonological complexity. Moreover, Amayreh and Dyson (1998), in their study of the acquisition of Arabic consonants, mention that there are marked sounds and unmarked sounds, and they are marked or unmarked by definition. Unmarked sounds are acquired before marked ones. Marked sounds are more difficult to produce, and they occur less in a language. Children may replace the marked sounds with their unmarked counterparts. If the sound has a secondary articulation, for example, then the child would pronounce it without the secondary articulation (Amayreh and Dyson, 1998). This point will be elaborated more upon in the discussion section. Ingram (1989) explains the early acquisition of some of the unmarked sounds during an early stage, and he argues that these

unmarked or difficult sounds are acquired early because of their functional load in the language. A sound that occurs frequently in a language functions in many phonological oppositions, so it has a high input level for the child learning to speak. We can also compare these sounds with other languages with the same sounds and see how the markedness affects the stage of the acquisition. In the next section, I talk about the case study and look at the data and the findings concerning the acquisition of pharyngeals.

Most recent studies on the acquisition of these sounds are those done by Mashaqba and Hadban (2024) and Mashaqba et al. (2022). Mashaqba and Hadban (2024) investigated the phonological development of six guttural consonants (/x/, /ʁ/, /ħ/, /ʕ/, /ʔ/, and /h/) in typically developing, monolingual Ammani-Jordanian Arabic–speaking preschoolers aged 2 to 6 years. The study employed an articulation test consisting of two tasks: picture naming and repetition. Forty children were divided into eight age groups. The analysis focused on production accuracy to determine three developmental stages for each guttural customary production, acquisition, and mastery. The results of their study indicate that /x/, /ħ/, /ʕ/, and /ʔ/ were acquired before age 6. On the other hand, Mashaqba et al. (2022) examined the production of Arabic guttural consonants by native speakers and non-native speakers of Arabic. The study involved 40 participants who provided 240 tokens through free speech and nonsense word tasks. The findings revealed that non-native speakers exhibited less coarticulatory influence on neighboring vowels, indicating insufficient constriction in the posterior vocal tract during guttural articulation. Auditory assessments ranked the voiced pharyngeal fricative /ʕ/ as the least accurately produced.

2. Methodology

2.1. The case study

This section looks at the data from the bilingual and monolingual subjects, the methodology of the research, and the empirical findings. This research was conducted using a case study since a case study is research, an isolated case study is very important since findings can be different from those of a group case study. According to Schneider-Zioga (2012), case studies are important because they can show unusual results that we cannot find in a group study.

2.2. Participants

Two typically developing female children were selected: an Arabic-English bilingual and an Arabic monolingual, both with no apparent speech impairment or other physical or mental disabilities. It is also noteworthy that the monolingual child is two months older than the bilingual child. Data were first collected from the bilingual child at 26 months of age, while data from the monolingual child were collected at 28 months. Data collection spanned two months for the monolingual child and eight months for the bilingual child. It should be mentioned that the duration of data collection does not influence the results or findings of the study, as children master sound production as they grow. In this case, the monolingual child was 30 months old when data collection concluded, while the bilingual child was 34 months old. The reason the data collection extended an additional six

months for the bilingual child is that the data from the monolingual child were sufficient to demonstrate her ability to produce the /ħ/ and /ʕ/ sounds, but the data from the bilingual child were inadequate after two months of recording. Therefore, it was necessary to extend the data collection period to determine when she could produce the /ħ/ and /ʕ/ sounds. Regarding the participants' locations, the monolingual child resides in Iraq, while the bilingual child lives in the United States.

The monolingual child, referred to here as Mimo, is exposed to Iraqi Arabic mainly through her mother, as well as her father and other family members, including cousins of the same age and adult uncles and aunts living in the same household. The bilingual child, referred to here as Lulu, is exposed to both English and Arabic from the age of six months. She receives English input from various sources, including her father, who is not a native English speaker, through book reading and storytelling, and at daycare from her caregivers, who are native English speakers, as well as other children at the daycare with whom she spends three hours a day. Although the extent to which TV shows influence language acquisition is debated, Lulu does receive some English input from children's television programs. Lulu can be considered bilingual since she speaks English and Arabic simultaneously, producing more English words and phrases than Arabic. The question arises as to whether she is a native English speaker or a native Arabic speaker. Considering that her mother is a native Arabic speaker, it can be claimed that Lulu is a native Arabic speaker. However, she started receiving more English input than Arabic at six months old and is more comfortable using English than Arabic. Thus, as mentioned earlier, the bilingual child in this study is a consecutive bilingual since the second language input came after six months of the Arabic input. However, for the purpose of this study, whether she is a native speaker of English or Arabic does not impact the results or objectives, as the study investigates and compares the acquisition of pharyngeals in a monolingual Arabic-speaking child and a bilingual English-Arabic speaking child, regardless of whether the child is native in Arabic or English, focusing on the aspect of bilingualism, which Lulu demonstrates by speaking both languages.

2.3. Stimuli

The data from Mimo was collected using the free speech approach where her mother was asked to record her speaking about different things on different occasions. The mother stimulated the child to speak by engaging her in turn-taking conversations such as asking her 'what did you do yesterday?', 'Where did we go this morning?', 'Who did you see?', and 'What does someone do?', etc., and by some naming activity, such as the mother would point at something, and the child would name it. As the child spoke, she uttered words containing the pharyngeals in different word positions.

As for Lulu, data was collected through pictures of animals, places, and people where the sounds /ħ/ and /ʕ/ can be found a lot, as well as through free speech with turn-taking conversations between the mother and the child. In some cases, the mother tried to bring about some questions with words that have pharyngeal so that the child could utter these words in her answers. For instance, the mother would say, "Do you want to go to the

bathroom?" and the child replies, "Yes" then the mother says, "Where do you want to go?". Additionally, both children did not know that they were being recorded, so they may not get distracted or feel shy to speak. This was done mainly to ensure that all the collected data came out of the subjects naturally and spontaneously.

2.4. Procedure

Recordings of Lulu were also done by the mother, but with the researcher's supervision, since this child is living in the same area where the researcher lives. The reason why the recording was done by the mother is the Arabic input that the child gets is from the mother, and she is used to talking in Arabic with her mother. The mother recorded the child during turn-taking conversations during play and mealtimes. Another way data was elicited is by showing pictures with names of things, animals, or persons with pharyngeal in them. So, the child would look at the picture, and the mother would ask what this was while the camera was filming for the whole session. Data transcription started after completing all the data collection and the recording. After that, words with pharyngeal sounds were listed and counted to see the number of words that have pharyngeal sounds and the number of times where the pharyngeal was pronounced correctly, whether in word-initial, word-medial, or word-final positions.

3. Findings

After completing the data collection, the analysis stage began, during which the recordings were examined using PRAAT following the writing and transcription of all the words containing the sounds //ħ/ and /ʕ/ (see the appendix). There are 25 words with the pharyngeal /ħ/ and 21 words with the pharyngeal /ʕ/ from Lulu, while Mimo produced six words with the pharyngeal /ħ/ and 15 words with the pharyngeal /ʕ/. One might expect more words with pharyngeals to come from Mimo; however, this study focuses on the mastery of these sounds by the child, regardless of the number of tokens, since Mimo did produce the sounds. Moreover, the timeframe for data collection was longer for Lulu than for Mimo. Furthermore, during the data discrimination, words were counted as types rather than tokens, primarily because pharyngeals are very common in Iraqi Arabic and have a significant functional load. Thus, every word that was said and repeated many times by the subjects in the recordings was recorded only once in the dataset. For instance, the word /ʔaħəbak/, which means "I love you," was uttered hundreds of times, yet I included it just once in the data. This word also has other derivations such as /ħabibi/ "my love," /ħubbi/ "my love," /ħabib/ "lover," and /ħub/ "love." I decided to include only types to avoid repetition of the same words.

Both subjects have uttered the word /ħabibi/ "my love" or one of its derivations many times, but I included only one type since for Mimo, the production of the /ħ/ was perfect, and for Lulu, the /ħ/ was produced as /h/ in all cases. So, the number of words is way more than that, and if all the words that were said by the two subjects were included, there would

have been hundreds of words, and that is why only the types were included, not the tokens, to avoid repetition.

It was mentioned earlier that Amayreh and Dyson (1998) claimed that pharyngeals are acquired in the intermediate and the late stage of acquisition, and this is different from what is found in the data from Mimo because she acquired the sound /ʕ/ during the intermediate consonant period, while the /ħ/ was acquired at the right time according to what Amayreh and Dyson claimed. Moreover, Omar (1973) claimed that the /ʕ/ is acquired at the age of 4.5 years, which is, in this case, in the late consonants period. It is noticed that Mimo is able to produce the pharyngeals in all the positions in the words, and she had no difficulty doing that. So, by the age of 26 months, Mimo has acquired the pharyngeal sounds. According to the data, the /ħ/ is also in the intermediate consonants period, and it matches Amayreh and Omar's findings. This, of course, supports Ingram's theory about the functional load. The sound /ʕ/ occurs a lot in Iraqi Arabic, so it is acquired early. Moreover, data from Mimo diverges from the findings of Mashaqba and Hadban (2024), who stated that gutturals are acquired by the age of six. However, Mimo was able to produce them at just 26 months, significantly earlier than the reported age.

Moving on to the data from Lulu, it is found that she produced the phoneme /ħ/ correctly only two times in the word /ɣoħ/ "you go" and also in /baħ/ "finished." However, it is also noticed that she produced it in the word /ʔaħ/ "he went." It is noteworthy that this word is mentioned earlier as a future marker, making it very common. Yet, Lulu did not articulate the /ħ/ every time she said this word. It is assumed that her articulation of the sound is at 25% compared to an adult's speech. This limited articulation can be attributed to the fact that Lulu said the pharyngeal /ħ/ in only two words: /ʔoħ/ "you go" and /baħ/ "finished." In all other instances, she replaced the pharyngeal /ħ/ with the glottal /h/ as in /hakira/ (the adult version being /ħaqira/), meaning "a mean girl," and with the glottal stop /ʔ/ in words such as /ʔʊbi/ (the adult version being /ħʊbi/), which means "my love." She also omitted it in some words like /wæs/, whose adult version is /ħwæs/ meaning "clothes." It seems she has difficulties articulating pharyngeals in word-initial positions. The pharyngeal /ʔ/ was never produced correctly, and the child simply replaced it with the glottal stop /ʔ/ in words like /ʔɪnab/ (the adult version being /ʕənab/), meaning "grapes," /ʔanʔan/ (the adult version being /ʕanʕan/), which is "a proto word for car," and /ʔanif/ (the adult version being /ʕanif/), which means "violent." She also deleted it in other words like /tam/ (the adult version being /matˁʕamʕ/), meaning "restaurant," /malaka/ (the adult version being /maʕlaqa/), meaning "spoon," and /samba/ (the adult version being /sabʕa/), meaning "seven." Below are two charts illustrating the number of words produced that contain pharyngeal sounds, the number of times they were produced correctly, and the phonological processes they underwent if not produced correctly. The data from Lulu somewhat aligns with the findings of Mashaqba and Hadban (2024) in that she deleted or replaced the pharyngeals with another sound. However, it corroborates with what Mashaqba et al. (2022) found in their study on the acquisition of gutturals by non-native speakers, indicating that the articulation was not accurate.

Table 1
Data from the bilingual subject

The voiced pharyngeal fricative /ʕ/	**The voiceless pharyngeal fricative /ħ/**
It occurred in 21 words	It occurred in 25 words
ʕ → ʔ: 15 words 75%	ħ → h: 16 words 65%
ʕ → Φ: 6 words 25%	ħ → ʔ: 4 words 20%
No deletion process 0%	ħ → Φ: 3 words 10%
No correct production 0%	2 correct productions 5%

Table 2
Data from the monolingual Subject

The voiced pharyngeal fricative /ʕ/	**The voiceless pharyngeal fricative /ħ/**
It occurred in 15 words	It occurred in 6 words
It was produced correctly in all the words 100%	It was produced correctly in all the words 100%

It is worth mentioning that Lulu uses many English words when talking in Arabic with her mother. When the mother was asked about this phenomenon, she said that Lulu uses English words when she speaks Arabic because she does not know the word in Arabic, so she uses the English version. It is obvious here that Lulu's mental lexicon of English is greater than her Arabic mental lexicon. If we are to compare the number of pharyngeals said by an adult, we would also find the same number of words since these are conversations with young children, and even if pharyngeals are very common in Iraqi Arabic, there are still many words with pharyngeals that are not in the lexicon of young children. Moreover, the words included in the data reflect the most used and most common words with pharyngeals.

3.1. Observations

In order for us to establish a generalization on the acquisition of phonology by children that are specific to this case study, the children's speech needs to be compared with the adult's speech as well as the way of producing speech sounds between the two groups. the production of the sounds under study with the adult version was compared, the sounds were included in the data set whether they were perfectly produced or not. Looking at the data and the findings, we can now make some generalizations about the acquisition of the pharyngeals /ħ/ and /ʕ/ by Arabic-English bilingual children and Arabic monolingual children. These generalizations are only related to the study and the subjects and findings may vary if we do a study on different or add more data from other children to our corpus.

Based on the longitudinal case study of two children, the following observations are presented within the limits of the acquisitional and production processes of the pharyngeal sounds /ħ/ and /ʕ/ observed in these two children:

1. ***Arabic-English bilinguals in this study*** *appear to acquire pharyngeals and the phonology of the language at a slower rate than their monolingual peers. This finding aligns with Paradis's (2001) theory of deceleration, which states that bilingual children may experience a delay in acquiring certain linguistic features due to simultaneous exposure to two languages.*
2. ***The Arabic monolingual children in this study*** *were observed to acquire the pharyngeals /ħ/ and /ʕ/ by the age of 26 months, which falls within the intermediate acquisition stage of 2 to 4 years. This suggests that the frequency and functional load of these phonemes in the language play a significant role in their early acquisition.*

It is important to note that these observations are based on the data collected from the specific subjects in this study. Whether these findings can be generalized to a larger population remains an open question, and future studies that replicate similar conditions and methodologies should address this question. Further research with a larger sample size and diverse linguistic environments is necessary to determine the extent to which these observations apply to a broader context.

4. Discussion

According to the data, it is clear that Mimo acquired the phonology of the language based on the functional load of the phonemes rather than the articulatory difficulty. The theories presented will be applied at the beginning of the study to the findings of this research to determine which of the theories align.

Let's start with the maturationalist theory that assumes that the articulatory difficulty determines the order of the acquisition of the phonemes (Paradis, 2001). The data from Mimo shows that the acquisition of pharyngeals occurred at an early age, although many researchers said that the acquisition of pharyngeals occurs at a late stage (Amayreh and Dyson, 1998; Mashaqba and Hadban, 2024). As for Lulu, it is difficult to tell whether the pharyngeals are difficult to produce or it is just that bilinguals are exposed to two systems at the same time, and this could result in some delay in the acquisition of some phonemes, which aligns with the findings of Mashaqba et al. (2022).

The NeoJakobsonian theory assumes that the phonological complexity determines the order of the acquisition (Jakobson, 1968). According to the data of this study, there might be something wrong with this theory since Mina acquired the pharyngeals, which are considered very complex sounds (Al-Ani, 1970) by the age of 26 months, and this is a very early stage of acquiring such complex sounds, she also has a native-like production of stops, nasal, glides, and fricatives. There are some sounds that were not acquired, such as the emphatic sounds, which are very hard to produce by young children since they involve a secondary articulation; Amayreh and Dyson (1998) said that emphatics are acquired after the age of six and Mashaqba and Hadban (2024) said these sounds are acquired before the age six. It is difficult to tell why Lulu has not acquired these two sounds yet, whether it is because they are complex or because something else is going on when children acquire two linguistic systems at the same time. Therefore, it

is thought that looking at her acquisition of other phonemes might provide an insight into her case.

It was mentioned earlier that there are theories explaining bilingual language acquisition, such as acceleration, deceleration, and transfer (Paradis and Genesee, 1996). Acceleration suggests that bilinguals acquire language faster than their monolingual peers who are exposed to one of the languages that the bilingual learns. In contrast, deceleration posits that bilinguals acquire language at a slower rate than their monolingual counterparts. According to the deceleration theory, the reason Lulu has not acquired pharyngeals is that certain features in the other linguistic system—English, in this case—are hindering some features in Arabic from surfacing. It appears that Lulu experiences a general delay in phonological acquisition, as she has not acquired many other common sounds either, while Mimo has mastered them, except for the emphatic consonants, which are generally difficult for children of this age and are regarded as late acquisitions.

5. Implications

This study is potentially useful in various fields, such as speech pathology and speech disorders. It is important to understand how children acquire speech sounds and, more significantly, how bilingual children develop these sounds, as this can often concern parents who notice their children seem slower than their peers in certain respects. However, by conducting studies and research, we can raise awareness and assist professionals from other disciplines in gaining the necessary knowledge. Furthermore, this study could prompt further investigations into the acquisition of pharyngeals by collecting additional data from a larger group of children.

6. Conclusion

In this study, a comparison of the acquisition of pharyngeals between an Arabic-English-speaking bilingual child and an Arabic-speaking monolingual child was made. the data shows, at least in the two subjects of the study, that bilinguals acquire the phonology of the language in general, at a slower rate as compared with their monolingual peers. The data was also applied to some theories in the literature, and it was found that bilinguals undergo a deceleration process because features in one of the languages they are exposed to are impeding other features in the other language. This, of course, does not happen with monolinguals since they only acquire one linguistic system. Moreover, the data from Mimo seem to contradict Amayreh and Dyson's claim that pharyngeals are late consonant since our data show that the monolingual subject acquired the pharyngeals at an early stage (26 months). The findings also disagree with Jacobson (1968), who claims that the order of the acquisition is universal since we also found out from our data that the acquisition varies and does not rely on the complexity or the difficulty of the phonological system of the language, but rather, it relies on the functional load of the phonemes and this is of course according to Ingram (1989) who claims that the frequency of the occurrence and the functional load of the phonemes determine the order of the acquisition. The acquisition is not a universal one, after all. Additionally, the

findings here disagree with Mashaqba and Hadban (2024) who claimed that gutturals are acquired before the age of six, which is also true for the monolingual subject, but 26 months is far away from six. The findings also are also different from those of Mashaqba et al. (2022) who found that the /ʕ/ is the least accurate sound to be articulated. It is worth noting here that the difference in findings between this case study and the other studies mentioned does not mean that other studies are incorrect since the variation in findings compared to previous studies may be attributed to several factors, including methodological differences, variations in sampling procedures, differences in dialects or varieties, individual differences, diverse analytical approaches, and the use of different stimuli.

The findings from Lulu's case show that the functional load theory did not work here. As mentioned, many common sounds in Iraqi Arabic and English were not produced by Lulu. Moreover, the tense markers mentioned earlier,/ɣaħ/ and /ʕa-/, are very common, and both have the pharyngeals, yet Lulu did not acquire or produce them. It may be challenging to say that bilinguals acquire pharyngeals late since there are many other sounds that are late as well. It might be the case that bilinguals are slower at acquiring the phonology of the language in general, or according to the bilingual subject at least, and that the process of acquiring two linguistic systems is slowing this acquisition since Mimo has developed a very good phonology by the age of 26 months. Bilinguals are not less proficient than monolinguals when it comes to language acquisition; they are just acquiring two different systems simultaneously, and this process may result in some delay, as the deceleration theory assumes. It is assumed here that when it comes to language acquisition, we might notice some delay in acquiring certain linguistic aspects, such as the case of this study, although this study is based on two subjects only, and this delay does not make bilinguals less proficient than monolinguals.

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The author reports there are no competing interests to declare.

Data availability statement

The data supporting this study's findings are available in Appendix below. The tables show all the words produced by the two study participants.

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Appendix

Table 1A
Words with the pharyngeal /ʕ/ from Lulu

N	Lulu's word	Adult version	Meaning
1	ʔınab	ʕənab	Grapes
2	ʔaji	ʕali	Ali – male name
3	ʔam	ʕam	A proto word for candies or cookies
4	ʔanʔan	ʕanʕan	A proto word for car
5	tam	matˁʕamʕ	Restaurant
6	malaka	maʕlaqa	Spoon
7	saaba	sabʕa	Seven
8	ʔabbaʔa	ʔarbaʕa	Four
9	təsʔa	təsʕa	Nine
10	abataʔəʃ	ʔarbatˁaʕəʃ	Fourteen
11	ʔəʃin	ʕəʃin	Twenty
12	ʔabana	ʕarabaana	Stroller
13	ʔaoʔao	ʕaoʕao	Doggie
14	ʔɛɛb	ʕɛɛbɛ	Ethically wrong
15	ʔufini	ʕufini	Leave me alone
16	ʔanif	ʕanif	Violent
17	ʔaabət	ʕaabət	A word you say to somebody who you do not like his or her face
18	maaf	maʕɣəf	I do not know
19	naan	naʕal	Sandal
20	nəssaan	nəʕsaan	Sleepy
21	ʔankud ʔənab	ʕanqud ʕənab	Grapes bunch

Table 1B
Words with the pharyngeal /ħ/ from Lulu

N	Lulu's word	Adult version	Meaning
1	jaħ or jah	ɣaħ	He went
2	ʕoħ	ɣoħ	Go
3	baħ	baħ	Finished
4	hammam	ħammam	Bathroom
5	ʔʊbi	ħʊbi	My love
6	ʔahəbki	ʔaħəbki	I love you
7	wad	waħəd	One
8	ʔakomi	ħakomi	Hakomi – a male name
9	ʔabibi	ħabibi	My love
10	wæs	ħwæs	Clothes
11	həbini	tħəbini	Do you love me
12	həku	ʔaħləqu	I shave him
13	hakira	ħaqira	Mean
14	hɛwani	ħɛwani	Animal
15	maha	ħmaɣa	Donkey – for a female
16	hanafiji	ħanafiji	Water spout
17	ʔɛha	ɣɛħa	Perfume
18	ʔakam	ħakam	Hakam – a male name
19	hmæɣ	ħmæɣ	Donkey – for a male
20	dʒahəʃ	dʒaħəʃ	A kind of donkeys
21	hababa	ħabbaba	Lovely
22	ʔahəb	ʔaħəb	I love

23	hasan	ħasan	Hasan – a male name
24	hasuni	ħasuni	Hasouni – a male name
25	taha	ʔəftaħa	Open it

Table 2A
Words with the pharyngeal /ħ/ from Mimo

N	Mina's word	Adult version	Meaning
1	ħəlu	ħəlu	Beautiful
2	daħqi	daħqi	Look at me
3	ʔaħmaɣ	ʔaħmaɣ	Red
4	təfaħa	təfaħa	Apple
5	maliħa	maliħa	Fine
6	ħasan	ħasan	A male proper name

Table 2B
Words with the pharyngeal /ʕ/ from Mimo

N	Mina's word	Adult's version	Meaning
1	ʔaqaʕ	ʔaqaʕ	I fall down
2	maʕæki	maʕæki	With you
3	ʕamija	ʕamija	A proto word for a cookie or candy
4	qɛʕəd	qɛʕəd	He is awake/ sitting down
5	baʕija	baʕija	A proto word for an animal
6	waqqaʕu	waqqaʕu	He made it fall
7	ʕala	ʕala	On
8	ʕammo	ʕammo	Uncle
9	jəlʕab	jəlʕab	He plays

10	təqaʕ	təqaʕ	She falls
11	taʕæl	taʕæl	Come
12	təʕmal	təʕmal	She makes
13	ʕalɛna	ʕalɛna	On us
14	ʕali	ʕali	A male proper name
15	maʕa	maʕa	With