

Epenthesis in Child Speech

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Abstract

This study investigates one of the phonological processes used by children which is technically known as epenthesis which means the insertion of new sound in a word to make its pronunciation easier. It is divided into three types: vocalic, anatyxis and excrescence epenthesis. The study tackles epenthesis in the speech of Mosuli – Arabic children at the age of three to four and half years old. Epenthesis is used in children speech as a sign of simplification. It is found that epenthesis occurs initially which is called vocalic in the speech of those children such as /dʒdi:d/ → /ʔidʒdi:d/ as well as medially which is called anatyxis such as /dʒdi:d/ → /dʒadi:d/ ; while excrescence is not found in the speech of those children. Moreover, epenthesis increases the number of syllables in the pronounced words.

Keywords: Epenthesis, Phonological Processes, Children, Insertion, Speech, Pronunciation, Vocalic, Sounds, Simplification.

الاقحام في كلام الطفل

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المستخلص

تعالج هذه الدراسة إحدى الظواهر الصوتية المستخدمة لدى الأطفال والتي تعرف تقنياً بالإقحام؛ وهي عملية إدخال صوت جديد إلى الكلمة لتسهيل عملية لفظها.

وتقسم هذه الظاهرة على ثلاثة أنواع وهي (vocalic) أي الاعلال؛ الذي يعني إضافة صوت وغالباً ما يكون معتلاً إلى بداية الكلمة و(anaptyxis)؛ والذي يعني اقحام صوت علة بين السواكن و(excrescence)؛ التي تعني اقحام صوت ساكن بين الأصوات الساكنة أو المعتلة.

وتعالج الدراسة هذه الظاهرة في كلام الأطفال الذين يتحدثون العربية الموصلية ممن تتراوح أعمارهم بين الثالثة والرابعة والنصف ويستخدم الاقحام في كلام الأطفال كإشارة لتسهيل نطقهم. وقد يكون موقع الاقحام في بداية الكلمة ويسمى (vocalic) أو في وسطها ويسمى (anaptyxis) بينما النوع الأخير (excrescence) ليس له وجود في كلام هؤلاء الأطفال. ومن الجدير بالذكر أن الاقحام بأنواعه الثلاث يزيد عدد المقاطع في الكلمات المنطوقة.

الكلمات المفتاحية: الاقحام، العمليات الصوتية، الاطفال، حشر، كلام، لفظ، صوتي، اصوات، تبسيط.

Mosuli Arabic Consonants (See Table (1))

/ʔ/ as in:	اخضع	/ʔaxðas/	"green"
/b/ as in:	باب	/ba:b/	"door"
/p/ as in:	بردة	/parda/	"curtain"
/t/ as in:	تمارة	/ta'ma:ra/	"a girl's name"
/θ/ as in:	ثوم	/θu:m/	"garlic"
/dʒ/ as in:	جويغب	/dʒa'we:ɪb/	"socks"
/tʃ/ as in:	چاي	/tʃa:j/	"tea"
/ħ/ as in:	حبل	/ħabil/	"robe"
/x/ as in:	خيمي	/xe:mi/	"tent"
/d/ as in:	دب	/dib/	"bear"
/ð/ as in:	ذهب	/ðahab/	"gold"
/r/ as in:	رنا	/rana:/	"a girl's name"
/z/ as in:	زنجاغ	/zin'dʒa:Ɂ/	"rust"
/s/ as in:	سني	/sani/	"year"
/ʃ/ as in:	شكر	/ʃakar/	"sugar"
/s/ as in:	صبع	/ʃabiɁ/	"paint"
/t/ as in:	طباشير	/taba:'ʃi:r/	"chalk"
/ð/ as in:	ظرف	/ðarif/	"envelope"
/ʕ/ as in:	عين	/ʕe:n/	"eye"
/ʕ/ as in:	غبي	/ʕabi/	"stupid"
/f/ as in:	فلوس	/flu:s/	"money"
/q/ as in:	قلم	/qalam/	"pencil"
/k/ as in:	كتاب	/ki'ta:b/	"book"
/g/ as in:	كراج	/ga'ra:dʒ/	"garage"
/l/ as in:	لقلق	/laqlaq/	"stork"
/l/ as in:	لخص	/laxxaʃ/	"he summarized"
/m/ as in:	مكتب	/maktab/	"bureau"
/n/ as in:	نبات	/na'ba:t/	"plant"
/h/ as in:	هالة	/ha:la/	"a girl's name"
/w/ as in:	وغد	/waɪd/	"flowers"
/j/ as in:	يبنى	/jibni/	"he builds"

Mosuli Arabic Vowels

/i:/ as in:	دين	/'di:n/	"religion"
/i/ as in:	فجل	/fi'dʒil/	"radish"
/e:/ as in:	كيك	/'ke:k/	"cake"
/ɑ:/ as in:	ساعة	/sa:'ʕa/	"watch"
/a/ as in:	قلم	/'qalam/	"pencil"
/o:/ as in:	فوق	/'fo:q/	"on"
/u/ as in:	ذُكى	/ðuka/	"a girl's name"
/u:/ as in:	ثوم	/'θu:m/	"garlic"

1. Introduction:

Epenthesis is one of the phonological processes (*) [1-4] used by children, it can be defined, it can be defined phonetically as the insertion of a new (epenthetic) sound in a word to make its pronunciation easier. It refers to the process where by a vowel or a consonant is inserted in an existing sequence to facilitate pronunciation [5-7]. Epenthesis is an ancient Greek word it was used in the middle of the sixteenth century, from epi "on" + en "in" + thesis "putting". It is used by children aged between two years and a half, and eight years old [8].

Epenthesis is often used as an attempt to connect words and syllables smoothly in normal speech. The most important type of epenthesis occurs with the addition of the regular plural –s and the past tense –ed endings. In both these cases, an epenthetic schwa /ə/ is added to break up resulting clusters of sibilants or alveolar stops. A second commonly occurring type of epenthesis in connected speech involves the insertion of a vowel to facilitate the pronunciation of a consonant cluster. [7].

(*) phonological process (such as metathesis, substitution and so on) can be defined as what the child brings to the language in order to simplify adult words. They are often recognized by parents as simple pronunciation errors.

2. Types of Epenthesis:

Epenthesis can be divided into three types which are excrescence, anatyxis (or svarabhakti) and vocalic (or prothesis) epenthesis.

2.1 Excrescence:

This type of epenthesis is also divided into two kinds, the first kind refers to a consonant which is inserted between other consonants to facilitate the process of articulation. In this type, the place of articulation should be different, i.e., when there are two consonants, the first is labial and the other is alveolar or dental. For example, some speakers pronounce *sompthing */sʌmpθɪŋ/ instead of something /sʌmθɪŋ/; [m] is bilabial while [θ] is dental.

The second kind of excrescence refers to a consonant which is inserted between vowels. For example, the [n] in the indefinite article (an) is used before vowel sounds; this [n] breaks up a sequence of two vowels:

a orange → an orange (historical change). Intrusive^()[ŋ] and linking [r] is another example of this kind [10][11].

2.2 Anatyxis or Svarabhakti:

The second type of epenthesis is anatyxis, which refers to the insertion of a vowel between two consonants. Anatyctic vowels are also named as parasite vowels or svarabhakti (Sanskrit term) [12]. In this process the inserted vowel breaks up consonant clusters. For example, the pronunciation of "athlete" /æθli:t/ becomes as /æθəli:t/ or /æθeli:t/ with the insertion of /ə/ or /e/.

(*) Intrusive or epenthetic [r] is inserted between words. The first of which ends with a vowel and the second begins with another vowel even when there is no letter (r) in the spelling, as in Africa and Asia /æfrɪkər ənd eɪʃə[ŋ].

Another example is the pronunciation of "film" /fɪlm/ becomes as /fɪləm/. To break consonant clusters /ə/ and /ɪ/ are usually used. /ɪ/ is pronounced in the suffixes (s or es) which are used in plural and third person singular if they are preceded by /s, ʃ, tʃ, z, ʒ, dʒ/ as in watch → watches /wDʃ/ → /wDʃɪz/; smash → smashes /smæʃ/ → /smæʃɪz/. It also breaks consonant clusters in the suffix (ed) which is usually used to form past and past participle of regular verbs especially when preceded by /t/ and /d/ as in want → wanted /wDnt/ → /wDntɪd/ end → ended /end/ → /endɪd/ [13][14].

2.3 Vocalic epenthesis (Prothesis):

The third type of epenthesis is not found in English which is called prothesis, it refers to the addition of a sound especially vowel to the beginning of a word. This type of epenthesis is also called vocalic epenthesis that occurs when words are borrowed from a language which has consonant clusters, that are not permitted in the borrowing language. So various vowels are used for this purpose, especially schwa when it is available. In the Western Romance languages for example, a vowel is inserted at the beginning of any word that begins with /s/. Just like Classical Arabic which does not allow clusters at the beginning of a word, and it uses [i] to break up these clusters in borrowings. Another example is in Latin which involves the insertion of [e] before "sp, st and sc) to break such clusters as in "espiritum" from "spiritum" [15][16][17].

Epenthesis is a common phenomenon both in a historical change and in connected speech. In old English (historical change) the word "thunor" became "thunder", /d/ is an epenthetic consonant in this example. Another example is the addition of [p] after [m] in word "empty" [18]. In connected speech /ə/ is a good example for epenthesis, which is used to break consonant

clusters for example happen can be pronounced /hæpn/ or /hæpən/.

This study concentrates on anatyxis and vocalic epenthesis in connected speech.

3. The Aim:

This study aims at exposing one of the phonological processes used by Mosuli Arabic children to simplify their speech. This process is called epenthesis.

4. The Hypotheses:

The following hypotheses can be concluded in Mosuli Arabic:

1. Epenthesis occurs initially as well as medially.
2. Epenthesis increases the syllables of the words.
3. Anatyxis and vocalic epenthesis are found in the speech of Mosuli Arabic children, but excrescence epenthesis is very rare.
4. Epenthesis is used by children to make their pronunciation easier.
5. Sometimes, elision and substitution occur with epenthesis.

5. Data Collection:

The data needed for this study have been collected from eight children chosen from the researchers' relatives, 3 of them are girls and the others are boys. Their ages are between 3 and 4.4 and their dialect is Mosuli^(*).

6. The Procedure:

The procedure followed in this study was as follows:

(*) Mosuli dialect among many dialects in Iraq, is spoken in Mosul city Iraq, which stands out from other dialects in many crucial respects: phonological, lexical and grammatical. [19][20].

A number of utterances produced by children were taken and analyzed. The sessions held were direct and the children tested were normal. The speech of children was carefully observed by the researchers themselves. The children were noticed for more than two months. Finally, the children's pronunciations (their utterances) were transcribed phonemically.

7. Data Analysis and Discussion:

Anatyxis and vocalic epenthesis are found in the speech of Mosuli Arabic children:

7.1 Anatyxis epenthesis:

Anatyxis epenthesis occurs in words which consist of one syllable or more than one:

7.1.1 One-syllable words → two-syllable words (see table (2))

	Adults' pronunciation	Children's pronunciation	The meaning of the words	The vowel inserted
1.	/dʒdi:d/	/dʒadi:d/	new	/a/ , /i/ /dʒidi:d/
2.	/flu:s/	/filu:s/	money	/i/
3.	/ħʂa:n/	/ħiʂa:n/	horse	/i/
4.	/fra:x/	/fira:x/	chicks	/i/
5.	/gla:ʂ/	/gila:ʂ/ /gala:ʂ/	glass	/i/ , /a/
6.	/smi:n/	/sami:n/	fat "masc. sing"	/a/
7.	/swa:ʂ/	/sawa:ʂ/	bracelet	/a/
8.	/ħze:m/	/ħize:m/	belt	/i/
9.	/xja:ʂ/	/xija:ʂ/	cucumbers	/i/
10.	/ħzu:z/	/ħazu:z/ /ħizu:z/	slices	/a/ , /i/
11.	/dʒbe:l/	/dʒibe:l/	mountains	/i/
12.	/ʂdʒe:l/	/ʂidʒe:l/	men	/i/
13.	/kle:b/	/kile:b/	dogs	/i/
14.	/tbe:l/	/tibe:l/	marbles	/i/
15.	/qħu:f/	/qiħu:f/	pots for planting	/i/ , /u/

	/quhu:f/		
16.	/ð ^h ɑ:f/	/ði ^h ɑ:f/	slim "pl." /i/
17.	/rmu:f/	/rumu:f/	eye lashes /u/
18.	/mɘajji/	/maɘajji/	mirror /a/
19.	/hwa:s/	/hawa:s/	clothes /a/
20.	/kbi:ɘ/	/kabi:ɘ/	big /a/
21.	/θne:n/	/θine:n/	two /i/
22.	/q ^h id/	/qi ^h id/	sid down "imp. masc. sing." /i/

In this case the children add new vowel such as /i, a, u/ to the words that consist of one syllable to facilitate their speech, those words will have more than one syllable.

7.1.2 Two-syllable words→Three-syllable words (see table (3))

Adults' pronunciation	Children's pronunciation	The meaning of the words	The vowel inserted
23. /siplit/	/sapalit/	air conditioner	/a/
24. /miθlak/	/maθalak/	like you	/a/

In these two examples the children change the first vowel /i/ into /a/ and add a new vowel which is /a/ ; so the words will have three syllables.

25.	/tla ^h i/	/tala ^h i/	go up the stairs "imp. fem. sing"	/a/
26.	/nzali/	/nazali/	go down the stairs "imp. fem. sing"	/a/
27.	/msaħa/	/masaħa/	he cleaned it "imp. masc. sing"	/a/
28.	/ftaħa/	/fitaħa/	open it "imp. masc. sing"	/i/
29.	/flaħa/	/falaħa/	put it of "imp. masc. sing"	/a/
30.	/bɘu:li/	/biɘu:li/	bottles	/i/
31.	/dʒju:bi/	/dʒiju:bi/	pockets	/i/,/u/
		/dʒuju:bi/		
32.	/sta:ɘa/	/sata:ɘa/	wall hangings	/a/
33.	/mkaʃʃaf/	/makaʃʃaf/	bare	/a/

34. /maʔam/	/maʔam/	a restaurant	/a/
35. /tiʔdʒibni/	/tiʔdʒibini/	I like it	/i/
36. /nafsu/	/nafasu/	itself "masc. sing"	/a/
37. /tfakri:n/	/tifakkiri:n/	you think "fem. sing"	/i/
38. /jiʔxiʃ/	/jiʔxiʃ/	he snores	/i/
39. /xaʃmi/	/xaʃami/	my nose	/a/
40. /madrasi/	/madarasi/	school	/a/
41. /jiʃdʒif/	/jiʃidʒif/	he tremble	/i/
42. /ʃwajja/	/ʃawajja/	little	/a/
43. /mxaddi/	/maxaddi/	pillow	/a/
44. /kle:tʃa/	/kile:tʃa/	puddings	/i/
45. /blu:zi/	/balu:zi/	my sweater	/a/
46. /tʃaʔʔa/	/taʃaʔʔa/	cover yourself "imp. masc. sing"	/a/, /i/
47. /tʃanni/	/taʃanni/	sing "fem. sing"	/a/, /i/
48. /mle:ha/	/male:ha/	fill it "imp. fem. sing"	/a/
49. /ʔliqa/	/ʔiliqa/	switch it on "imp. masc. sing"	/i/
50. /zʃajjia/	/zaʃajjia/	small	/a/
51. /stika:n/	/satika:n/	a cup of tea	/a/

In all these examples the children increase the number of the syllables by using the vowels /a/, /i/ and sometimes /u/.

7.1.3 Two-syllable words → Two-syllable words + Elision

(see table (4))

Adults' pronunciation	Children's pronunciation	The meaning of the words	The vowel inserted
52. /timsa:h/	/missa:h/	crocodile	/i/
53. /jiʔhliq/	/hiliq/	to have his hear cut " masc. sing"	/i/
54. /ʔaʔsan/	ʔasan/	better	/a/

(*) In this example the children double /k/ and add vowel /i/ twice.

55. /ʔanzal/	/nizal/	to descend	/i/
56. /ʔixla:s/	/xala:s/	a girl's name	/a/

In these examples the children omit the first syllable which is /ti/, /ji/, /ʔa/, /ʔa/, and /ʔi/ consequently, so these words still have two syllables.

7.1.4 Two-syllable words → Two-syllable words + Elision + Substitution^(*) [21-23] (see table (5))

Adults' pronunciation	Children's pronunciation	The meaning of the words	The vowel inserted
57. /ʔaħmaʁ/	/ħammal/	red	/a/
58. /ʔanwa:r/	/nawa:l/	a girl's name	/a/

In these two examples the children omit the first syllable which is /ʔa/, add new vowel which is /a/ and substitute the final consonants which are /ʁ/ → /l/ and /r/ → /l/ consequently.

7.1.5 Three – syllable words → Three – syllable words + Elision (see table (6))

Adults' pronunciation	Children's pronunciation	The meaning of the words	The vowel inserted
59. /tisbaħi:n/	/sabaħi:n/	do you have a bath	"fem. sing." /a/
60. /ʔastaħi/	/sataħi/	I feel shy	/a/
61. /nastala/	/satala/	a kind of sweet biscuit	/a/

In these examples the children omit the first syllable which is /ti/, /ʔa/ and /na/ consequently and add new vowel which is /a/.

(*) Substitution: refers to the process of replacing one sound by another without reference to neighboring sounds [21][22].

7.1.6 Three – syllable words → Four – syllable words (see table (7))

Adults' pronunciation	Children's pronunciation	The meaning of the words	The vowel inserted
62. /ftaħi:ha/	/fataħi:ha/	open it "imp. fem. sing"	/a/
63. /lbasi:ha/	/labasi:ha/	wear it "imp. fem. sing"	/a/
64. /ʔamʃi:ni/	/ʔammifi:ni/	let me see "imp. fem. sing"	/a/, /i/
65. /thibbi:ni/	/tihibbi:ni/	do you love me? "imp. fem. sing"	/i/
66. /ʔadli:ha/	/ʔadili:ha/	mind it "imp. fem. sing"	/a/
67. /qirde:la/	/qarade:la/	hair band	/a/
68. /tismaħi:n/	/tisamaħi:n/	would you mind? Excuse me "fem. sing"	/a/

In example No. 63 the children double /m/ and add two vowels which are /a/ and /i/ respectively; while in example No. 67 the children change the first vowel from /i/ → /a/ and add new vowel which is /a/. In other examples the children add /a/ and sometimes /i/ to facilitate their speech.

7.2 Vocalic Epenthesis

Vocalic epenthesis occurs in word which consist of one syllable or more than on:

7.2.1 One – syllable words → Two – syllable words (see table (8))

Adults' pronunciation	Children's pronunciation	The meaning of the words	The vowel inserted
69. /dʒdi:d/	/ʔidʒdi:d/	new	/i/
70. /flu:s/	/ʔiflu:s/	money	/i/
71. /hʃa:n/	/ʔihʃa:n/	horse	/i/
72. /fra:x/	/ʔifra:x/	chicks	/i/
73. /gla:ʃ/	/ʔigla:ʃ/	glass	/i/
74. /smi:n/	/ʔismi:n/	fat "masc. sing"	/i/
75. /swa:ʊ/	/ʔiswa:ʊ/	bracelet	/i/
76. /hze:m/	/ʔihze:m/	belt	/i/
77. /xja:ʊ/	/ʔixja:ʊ/	cucumbers	/i/
78. /hzu:z/	/ʔihu:z/	slices	/i/
79. /dʒbe:l/	/ʔidʒbe:l/	mountains	/i/
80. /ʊdʒe:l/	/ʔiʊdʒe:l/	men	/i/
81. /kle:b/	/ʔikle:b/	dogs	/i/
82. /tbe:l/	/ʔitbe:l/	marbles	/i/
83. /qhu:f/	/ʔiqhu:f/	pots for plantings	/i/
84. /ðʔa:f/	/ʔiðʔa:f/	slim "pl."	/i/
85. /rmu:f/	/ʔirmu:f/	eye lashes	/i/
86. /mʌajji/	/ʔimʌajji/	mirror	/i/
87. /hwa:s/	/ʔihwa:s/	clothes	/i/
88. /kbi:ʊ/	/ʔikbi:ʊ/	big	/i/
89. /θne:n/	/ʔiθne:n/	two	/i/

In all these examples the children add new syllable which is /ʔi/ at the beginning of the words. They use glottal stop which is normally followed by /i/ when it will be in the place of addition.

7.2.2 Two – syllable words → Three – syllable words (see table (9))

Adults' pronunciation	Children's pronunciation	The meaning of the words	The vowel inserted
90. /tlaʕi/	/ʔitlaʕi/	go up the stairs "imp. fem. sing"	/i/
91. /nzali/	/ʔinzali/	go down the stairs "imp. fem. sing"	/i/
92. /ʕte:ni/	/ʔiʕte:ni/	give me "fem. sing"	/i/
93. /msaħa/	/ʔimsaħa/	clean it "imp. masc. sing"	/i/
94. /qʕid/	/ʔiqʕid/	sit down "imp. masc. sing"	/i/
95. /ftaħa/	/ʔiftaħa/	open it "imp. masc. sing"	/i/
96. /ʃlaħa/	/ʔiʃlaħa/	put it of "imp. masc. sing"	/i/
97. /btu:li/	/ʔibtu:li/	bottles	/i/
98. /dʒju:bi/	/ʔidʒju:bi/	pockets	/i/
99. /sta:ʕa/	/ʔista:ʕa/	wall hangings	/i/
100. /mkaffaf/	/ʔimkaffaf/	bare	/i/
101. /tfakri:n/	/ʔitfakri:n/	you think "fem. sing"	/i/
102. /ʃwajja/	/ʔiʃwajja/	little	/i/
103. /mxaddi/	/ʔimxaddi/	pillow	/i/
104. /kle:tfa/	/ʔikle:tfa/	puddings	/i/
105. /blu:zi/	/ʔiblu:zi/	sweater	/i/
106. /tʂaʔta/	/ʔitʂaʔta/	cover yourself "imp. masc. sing"	/i/
107. /tʂanni/	/ʔitʂanni/	sing "fem. sing"	/i/
108. /mle:ha/	/ʔimle:ha/	fill it "imp. fem. sing"	/i/
109. /ʕliqa/	/ʔiʕliqa/	switch it on "imp. masc. sing"	/i/
110. /zʂajjiʕ/	/ʔizʂajjiʕ/	small	/i/
111. /stika:n/	/ʔistika:n/	a cup of tea	/i/

In all these examples the children add new syllable which is /ʔi/ at the beginning of the words, and these words will be three – syllable words.

7.2.3 Three – syllable words → Four – syllable words (see table (1)0)

Adults' pronunciation	Children's pronunciation	The meaning of the words	The vowel inserted
112. /ftaħi:ha/	/ʔiftaħi:ha/	open it "imp. fem. sing"	/i/
113. /lbasi:ha/	/ʔilbasi:ha/	wear it "imp. fem. sing"	/i/
114. /thibbi:ni/	/ʔithibbi:ni/	do you love me "fem. sing"	/i/

7. Conclusion:

The study has investigated one of the phonological processes used by children which is epenthesis. Children have natural inclination towards this process and this facilitates their speech. The results show that epenthesis occurs initially which is called vocalic epenthesis and medially which is called anatyxis epenthesis. In vocalic epenthesis children used to use glottal with the vowel /i/ while in anatyxis epenthesis they used /i/ , /a/ and to a less degree /u/ as in /rmu:ʃ/ → /rumu:ʃ/ "eye lashes". It is found that this process increased the number of the syllable in words. Besides, anatyxis epenthesis, sometimes, is accompanied with other processes such as elision and substitution.

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Table (1) Mosuli Arabic Consonants**Adopted from Sa'eed, 2006: 72 with some modifications****Note:** the symbol on the left in every column is voiceless while the symbol is voiced on the right is voiced

Place Manner		Bilabial	Labiodental	Interdental	Dental-alveolar	Palatoalveolar	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosives	Non-mufaxam	p b			t d				k g	q	ʔ
	Mufaxam				ʈ						
Fricatives	Non-mufaxam		f	θ ð	s z	ʃ		x		ħ	h
	Mufaxam			ð	ʂ						
Affricates						tʃ dʒ					
Nasals		m									
Laterals											
Tap						r					
Glides		w						j			

Table (2) Anatysis Epenthesis**One syllable words → Two syllable words****Note:** (✓) means the Child used epenthesis, while (×) means the child didn't use it.

Words (Data)	Subjects	A Male	Z Male	M Male	S Male	Y Male	jh Female	W Femal	R Femal
	Age	3 years	3 years and one month	3 years and 3 months	3 years and 6 months	3 years and 8 months	4 years	4 years and 2 months	4 years and 4 months
/dʒdi:d/ → /dʒadi:d/ or /dʒidi:d/		✓	✓	✓	✓	×	✓	✓	✓
/flu:s/ → /filu:s/		✓	✓	✓	✓	✓	✓	×	✓
/hʃa:n/ → /hiʃa:n/		✓	✓	✓	✓	×	✓	✓	✓
/fra:x/ → /fira:x/		×	✓	×	✓	✓	✓	✓	✓
/gla:ʃ/ → /gila:ʃ/ or /gala:ʃ/		✓	×	✓	×	✓	✓	✓	✓
/smi:n/ → /sami:n/		×	×	✓	✓	✓	×	×	✓
/swa:ʊ/ → /sawa:ʊ/		✓	✓	✓	✓	✓	✓	✓	×
/hze:m/ → /hize:m/		✓	✓	✓	×	✓	✓	✓	✓
/xja:ʊ/ → /xiʃa:ʊ/		×	✓	✓	✓	✓	✓	✓	✓
/hzu:z/ → /hazu:z/ or /hizu:z/		×	✓	✓	✓	✓	✓	✓	✓
/dʒbe:l/ → /dʒibe:l/		✓	✓	×	✓	✓	✓	×	×

Words (Data)	Subjects	A Male	Z Male	M Male	S Male	Y Male	jh Female	W Femal	R Femal
	Age	3 years	3 years and one month	3 years and 3 months	3 years and 6 months	3 years and 8 months	4 years	4 years and 2 months	4 years and 4 months
/sɖʒe:l/ → /vidʒe:l/		✓	✓	×	✓	✓	✓	×	×
/kle:b/ → /kile:b/		✓	✓	×	✓	✓	✓	×	×
/tbe:l/ → /tibe:l/		✓	✓	×	✓	✓	✓	×	×
/q̣hu:f/ → /q̣ihu:f/ or /qụhu:f/		✓	✓	✓	✓	✓	✓	✓	✓
/θ̣a:f/ → /ðịa:f/		×	✓	✓	✓	×	✓	✓	✓
/rmu:f/ → /rumu:f/		×	×	✓	✓	×	×	✓	✓
/ṃsajji/ → /mạsajji/		✓	✓	✓	✓	✓	✓	✓	×
/ḥwa:s/ → /ḥawa:s/		✓	✓	✓	×	✓	✓	✓	✓
/kbi:ʁ/ → /kabi:ʁ/		✓	✓	✓	✓	✓	✓	✓	✓
/θ̣ne:n/ → /θ̣ine:n/		✓	✓	✓	×	✓	✓	×	×
/q̣ʕid/ → /qịʕid/		✓	✓	✓	✓	×	✓	×	×

Table (3) Anatysis Epenthesis
Two – Syllable Words → Three Syllable Words

Words (Data)	Subjects	A Male	Z Male	M Male	S Male	Y Male	fh Female	W Femal	R Femal
	Age	3 years	3 years and one month	3 years and 3 months	3 years and 6 months	3 years and 8 months	4 years	4 years and 2 mont hs	4 years and 4 months
/siplit/ → /sapalit/		✓	✓	×	✓	×	✓	✓	✓
/miθlak/ → /maθalak/		✓	✓	×	✓	✓	✓	×	✓
/tlaʕi/ → /talaʕi/		✓	✓	✓	✓	×	×	✓	✓
/nzali/ → /nazali/		✓	×	✓	✓	✓	✓	✓	✓
/msaha/ → /masaha/		×	✓	✓	✓	✓	✓	×	✓
/ftaha/ → /fitaha/		✓	✓	✓	✓	✓	×	✓	×
/ɟlaha/ → /ɟalaha/		✓	✓	✓	✓	✓	✓	×	✓
/bɬu:li/ → /bitu:li/		✓	✓	✓	×	✓	✓	✓	×
/dʒju:bi/ → /dʒiju:bi/ or /dʒuju:bi/		✓	✓	✓	×	✓	✓	✓	✓
/sta:ʁa/ → /sata:ʁa/		✓	✓	×	✓	×	✓	✓	✓
/mkaɟʃaf/ → /makaɟʃaf/		✓	×	✓	✓	✓	×	✓	✓
/maɬʕam/ → /maɬaʕam/		✓	×	✓	✓	✓	✓	×	✓
/tiʕdʒibni/ → /tiʕdʒibini/		×	×	✓	✓	✓	✓	✓	✓
/nafsu/ → /nafasu/		✓	✓	×	✓	×	✓	✓	✓
/tfakri:n/ →		×	✓	✓	✓	✓	✓	×	✓

Words (Data)	Subjects	A Male	Z Male	M Male	S Male	Y Male	Jh Female	W Femal	R Femal
	Age	3 years	3 years and one month	3 years and 3 months	3 years and 6 months	3 years and 8 months	4 years	4 years and 2 mont hs	4 years and 4 months
/tifakkiri:n/									
/ji/xiɐ/ → /ji/xiɐ/		×	✓	×	✓	✓	✓	✓	✓
/xaʃmi/ → /xaʃami/		✓	✓	✓	×	×	✓	✓	✓
/madrasi/ → /madarasi/		✓	✓	✓	×	✓	×	✓	✓
/ʃiɔdʒiʃ/ → /ʃiɔdʒiʃ/		✓	✓	✓	✓	✓	✓	×	✓
/ʃwajja/ → /ʃawajja/		×	×	✓	✓	✓	✓	✓	✓
/mxaddi/ → /maxaddi/		✓	✓	×	×	✓	✓	✓	✓
/kle:tʃa/ → /kile:tʃa/		✓	✓	✓	✓	✓	×	✓	×
/blu:zi/ → /balu:zi/		✓	✓	✓	✓	✓	×	✓	✓
/tsaʃʃa/ → /tasatʃʃa/ or /tisatʃʃa/		×	✓	×	✓	✓	✓	×	✓
/tsanni/ → /tasanni/ or /tisanni/		✓	×	✓	✓	✓	✓	×	×
/mle:ha/ → /male:ha/		✓	✓	✓	✓	×	✓	×	✓
/ʕliqa/ → /ʕiliqa/		✓	✓	✓	✓	✓	✓	×	✓
/zəʃʃiɐ/ → /zaʃʃiɐ/		✓	✓	✓	×	✓	✓	✓	✓
/stika:n/ → /satika:n/		✓	×	×	✓	✓	✓	✓	✓

Table (4) Anatyxis Epenthesis
Two – Syllable Words → Two Syllable Words + Elision

Words (Data)	Subjects	A Male	Z Male	M Male	S Male	Y Male	jh Female	W Femal	R Femal
	Age	3 years	3 years and one month	3 years and 3 months	3 years and 6 months	3 years and 8 months	4 years	4 years and 2 months	4 years and 4 months
/timsa:h/ → /missa:h/		✓	✓	×	✓	✓	✓	✓	×
/jihliq/ → /hiliq/		✓	✓	✓	✓	×	✓	✓	✓
/ʔaḥsan/ → /ḥasan/		✓	✓	✓	✓	✓	×	✓	×
/ʔanzal/ → /nizal/		✓	✓	✓	✓	✓	×	✓	✓
/ʔixla:s/ → /xala:s/		✓	×	✓	✓	✓	✓	×	✓

Table (5) Anatyxis Epenthesis
Two – Syllable Words → Two Syllable Words + Elision + Substitution

Words (Data)	Subjects	A Male	Z Male	M Male	S Male	Y Male	Jh Female	W Femal	R Femal
	Age	3 years	3 years and one month	3 years and 3 months	3 years and 6 months	3 years and 8 months	4 years	4 years and 2 months	4 years and 4 months
/ʔahmaʔ/ →/hammal/		✓	✓	✓	✓	✓	✓	×	✓
/ʔanwa:r/ /→/nawa:l/		✓	✓	×	✓	✓	✓	×	×

Table (6) Anatyxis Epenthesis
Three – Syllable Words → Three Syllable Words + Elision

Words (Data)	Subjects	A Male	Z Male	M Male	S Male	Y Male	Jh Female	W Femal	R Femal
	Age	3 years	3 years and one month	3 years and 3 months	3 years and 6 months	3 years and 8 months	4 years	4 years and 2 months	4 years and 4 months
/tisbahi:n/ → /sabahi:n/		✓	✓	✓	✓	✓	✓	×	✓
/ʔastahi/ → /satahi/		✓	✓	✓	✓	×	✓	✓	×
/nastala/ → /satala/		×	✓	✓	✓	✓	×	✓	✓

Table (7) Anatysis Epenthesis**Three – Syllable Words → Four Syllable Words**

Words (Data)	Subjects	A Male	Z Male	M Male	S Male	Y Male	fh Female	W Femal	R Femal
	Age	3 years	3 years and one month	3 years and 3 months	3 years and 6 months	3 years and 8 months	4 years	4 years and 2 mont hs	4 years and 4 months
/ftahi:ha/ → /fatahi:ha/		✓	✓	✓	✓	×	✓	✓	×
/lbasi:ha/ → /labasi:ha/		✓	✓	✓	×	✓	✓	✓	✓
/ʔamʃi:ni/ → /ʔammijʃi:ni/		✓	✓	×	✓	✓	✓	×	✓
/thibbi:ni/ → /tihibbi:ni/		×	✓	✓	✓	×	×	✓	✓
/ʕadli:ha/ → /ʕadili:ha/		✓	✓	✓	✓	✓	✓	×	×
/qirde:la/ → /qarade:la/		✓	✓	✓	×	✓	✓	✓	×
/tismaʃi:n/ → /tisamaʃi:n/		×	×	✓	✓	✓	×	✓	✓

Table (8) Vocalic Epenthesis
One – Syllable Words → Two Syllable Words

Words (Data)	Subj ects	A Male	Z Male	M Male	S Male	Y Male	Jh Female	W Femal	R Femal
	Age	3 years	3 years and one month	3 years and 3 months	3 years and 6 months	3 years and 8 months	4 years	4 years and 2 months	4 years and 4 months
/dʒdi:d/ → /?idʒdi:d/		✓	×	✓	×	✓	✓	✓	✓
/flu:s/ → /?iflu:s/		✓	×	✓	✓	✓	×	✓	✓
/hʃa:n/ → /?ihʃa:n/		×	✓	✓	✓	×	✓	✓	✓
/fra:x/ → /?ifra:x/		✓	✓	✓	×	×	✓	✓	✓
/gla:ʃ/ → /?igla:ʃ/		✓	✓	✓	×	✓	×	✓	×
/smi:n/ → /?ismi:n/		×	×	✓	✓	✓	✓	×	✓
/swa:s/ → /?iswa:s/		×	✓	✓	✓	✓	✓	×	✓
/hze:m/ → /?ihze:m/		✓	×	✓	✓	✓	✓	✓	✓
/xja:s/ → /?ixja:s/		✓	✓	×	✓	✓	✓	×	×
/hzu:z/ → /?ihu:z/		×	✓	×	✓	✓	✓	✓	✓
/dʒbe:l/ → /?idʒbe:l/		×	×	✓	✓	✓	×	✓	✓
/ʈdʒe:l/ → /?iʈdʒe:l/		✓	✓	×	✓	✓	✓	✓	×
/kle:b/ → /?ikle:b/		✓	✓	✓	×	✓	✓	✓	✓

Words (Data)	Subj ects	A Male	Z Male	M Male	S Male	Y Male	Jh Female	W Femal	R Femal
	Age	3 years	3 years and one month	3 years and 3 months	3 years and 6 months	3 years and 8 months	4 years	4 years and 2 months	4 years and 4 months
/tbe:l/ → /?itbe:l/		✓	×	✓	✓	✓	✓	✓	×
/qhu:f/ → /?iqhu:f/		✓	×	✓	✓	✓	✓	✓	×
/ð ^ə ɑ:f/ → /?ið ^ə ɑ:f/		✓	✓	×	×	✓	✓	✓	✓
/rmu:ʃ/ → /?irmu:ʃ/		✓	✓	✓	✓	×	✓	×	✓
/msajji/ → /?imsajji/		✓	✓	✓	×	✓	✓	✓	×
/hwa:s/ → /?ihwa:s/		✓	✓	×	✓	×	✓	×	✓
/kbi:ʊ/ → /?ikbi:ʊ/		✓	×	✓	✓	✓	✓	×	✓
/θne:n/ → /?iθne:n/		✓	✓	✓	✓	×	✓	✓	✓

Table (9) Vocalic Epenthesis
Two – Syllable Words → Three Syllable Words

Words (Data)	Subjects	A Male	Z Male	M Male	S Male	Y Male	ʃh Fem ale	W Femal	R Femal
	Age	3 years	3 years and one month	3 years and 3 months	3 years and 6 months	3 year s and 8 mon ths	4 year s	4 years and 2 months	4 years and 4 month s
/tlaʕi/ → /?itlaʕi/		✓	×	✓	✓	✓	✓	✓	✓
/nzali/ → /?inzali/		✓	✓	✓	✓	×	✓	✓	✓
/ʕte:ni/ → /?iʕte:ni/		✓	✓	×	✓	✓	✓	✓	✓
/msaha/ → /?imsaha/		✓	✓	✓	✓	✓	×	✓	✓
/qʕid/ → /?iqʕid/		✓	✓	✓	×	✓	✓	✓	✓
/ftaha/ → /?iftaha/		✓	✓	×	✓	×	✓	✓	✓
/ʃlaha/ → /?iʃlaha/		✓	✓	×	✓	✓	✓	✓	×
/btu:li/ → /?ibtu:li/		✓	×	✓	✓	✓	✓	✓	✓
/dʒju:bi/ → /?idʒju:bi/		✓	✓	✓	✓	✓	×	✓	✓
/sta:va/ → /?ista:va/		✓	✓	✓	×	✓	✓	✓	✓
/mkaʃʃaf/ → /?imkaʃʃaf/		✓	✓	✓	✓	✓	×	✓	✓
/tfakri:n/ → /?itfakri:n/		✓	✓	✓	✓	×	✓	✓	✓

Words (Data)	Subjects	A Male	Z Male	M Male	S Male	Y Male	ʃh Female	W Female	R Female
		3 years	3 years and one month	3 years and 3 months	3 years and 6 months	3 year s and 8 mon ths	4 year s	4 years and 2 months	4 years and 4 month s
/fwajja/ → /?ifwajja/		✓	×	✓	✓	✓	✓	✓	✓
/mxaddi/ → /?imxaddi/		✓	✓	✓	×	×	✓	✓	✓
/kle:tʃa/ → /?ikle:tʃa/		✓	×	×	×	✓	✓	✓	✓
/blu:zi/ → /?iblu:zi/		×	✓	✓	✓	✓	✓	✓	✓
/tsaʈʈa/ → /?itsaʈʈa/		×	✓	✓	✓	×	✓	✓	✓
/tsanni/ → /?itsanni/		✓	✓	×	✓	✓	✓	✓	✓
/mle:ha/ → /?imle:ha/		✓	✓	✓	✓	✓	×	×	✓
/ʕliqa/ → /?iʕliqa/		✓	✓	✓	✓	✓	✓	✓	×
/zsaʃʃis/ → /?izsaʃʃis/		×	✓	×	✓	✓	✓	✓	✓
/stika:n/ → /?istika:n/		✓	✓	✓	✓	×	✓	✓	×

Table (10) Vocalic Epenthesis
Three – Syllable Words → Four Syllable Words

Words (Data)	Subjects	A Male	Z Male	M Male	S Male	Y Male	ʃh Female	W Femal	R Femal
	Age	3 years	3 years and one month	3 years and 3 months	3 years and 6 months	3 years and 8 months	4 years	4 years and 2 months	4 years and 4 months
/ftahi:ha/ → /?iftahi:ha/		✓	✓	✓	×	✓	✓	✓	×
/lbasi:ha/ → /?ilbasi:ha/		✓	✓	✓	✓	✓	×	✓	✓
/thibbi:ni/ → /?ithibbi:ni/		✓	×	✓	✓	✓	✓	✓	✓