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Licensing of Vowel Insertion Rules in Arabic Dialect of Yemen: Promising Hopes for Psychoneurolinguisttics

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Abstract
The study investigated vowel insertion in Arabic dialect of Yemen (ADY) by examining the differences that could be observed in the performance of educated and uneducated speakers from different sociolinguistic backgrounds. Spontaneous speech was recorded for thousand and seven hundred Yemeni male speakers (age ranges between 19 and 61 years old) who reacted to a seven-minute video where researchers have targeted words illustrating vowel insertion before they analyze them linguistically and statistically. Outlined results show that dialectal speech of the participants (educated and uneducated) is characterized by final insertion of monophthongs (short and long vowels) and diphthongs (closing) regardless if the plosives are released or not. Compared with educated participants, uneducated participants inserted more vowels and such vowel insertion significantly varies in each dialect under the umbrella of ADY. The study concluded to support the belief that vowel insertion is affected more by linguistic factors than by any other factor
(s). In light of these findings, it was recommended to investigate phonemic changes like vowel deletion, vowel lengthening and vowel substitution to see to what extent they are interacting in the multisyllabic words of ADY. Vowel insertion should also be searched in individuals with voice, speech and language disorders to see what the outcomes of such investigation could add to our psychoneurolinguistic knowledge of understanding these individuals' linguistic impairments.

Keywords: Vowel Insertion, Arabic Dialect of Yemen, Phonetics, Phonology, Syllables, Distinctive Features.

Introduction
In a broad variety of languages with phonetic and phonological features (Cruz , 2008; Gibson, 2019; Karlin, 2021; Kim & Kim, 2019; Rhee & Choi, 2001; Seo-Yoon, 2012; Yoo, 2009; Walter, 2018), monophthongs (short and long vowels) and diphthongs (closing and centering) are systematically subject to phonemic changes and segmentation processes that usually take place in the domain-final syllable of words where vowels are most often inserted (dos-Reis & de Lucena, 2020; Kwon, 2005). This is despite the fact that vowels at the end of a domain (utterance, clause, phrase, word) are generally prone to this phonemic movement in any position of the word (Borjian, 2012; Jacobsen, 1971) and is not restricted to standard languages but extends to cover dialects (Hammond, et al., 2014; Smith, 2014). Researchers have implemented phonemic variations as a clue (Machajdíková & Buzássyová, 2021) that enable them to comprehend mutual relationships ought to be drawn between accent, and lexicon from one side and also between accent and stressed syllable from another side (Chwesiuk, 2021).
As a result, researchers developed sociolinguistic rules and factors for vowel insertion that might be of some general interest (Anttila 1997, Hayes & Londe 2006, Hayes et al. 2009; Ho, 2006; Kiparsky 1993, Zuraw 2000, 2002, 2010; Yule 2010). These directions operated as guidelines for the definition of the concept of vowel insertion that is lexically concerned with "putting, thrusting and introducing into something" (Gove & Webster, 1981), while technically refers to the addition of one or more sounds to a word (Liddell & Johnson, 2011)

and is associated with consonants as well as with vowels in the world's languages (Gussenhoven (1990; Ladefoged & Maddieson, 1996).

Strictly, insertion is not the only way to avoid onset-less syllables (Rubach, 2000); rather, it is likely to be a source of unintelligibility (Cruz, 2008) and a universally applicable low-level effect. Virtually every language shows some degrees of vowel insertion (Park, 2001, 2005) as one of the most productive phonological processes (Frajzyngier, 2003; Hall, 2006; Uffmann, 2002) and Arabic is not an exception. Arabic has been investigated by researchers whodiscuss the background of the different dialects in the aboriginal tribal families of the Arabian Peninsula (Alazzawie, 2019), of which Arabic dialect of Yemen (ADY) is the most remarkable. The etymological material allows, in particular, important sociolinguistic conclusions to be drawn of the areal interrelationships and chronologies of expansion of the ADY.

The phonemic system of ADY has postulated that it has a two-level vowel distinction, i.e., short and long vowels vs. closing and centering diphthongs (Al Yaari, et al., 2022). However, it has been argued by Al Yaari and his colleagues that two sub-level monophthong and diphthong distinctions may not exist in ADY speakers (short vowels and centering diphthongs), because they found not to be lengthened but the case might change with vowel insertion. In order to understand the phonemic system of a language and/ or a dialect under the umbrella of that language, one should; however, consider pre-boundary language system in that language as well as in its varieties (Huh, 1984), focusing on how its sociolinguistic characteristics and demographic mobility (Janhunen, 2012) influence the speaker's oral realization of words with various dialectal structures and patterns.

In some papers, researchers have examined cases of vowel deletion (Al Yaari, et al., 2012) and vowel lengthening (Al Yaari, et al., 2022) and found in dialects of ADY what demonstrates characteristics of both phonetic and phonological deletion and lengthening. Based on a phonological analysis paired with acoustic corpus studies, researchers examined vowel insertion in individuals with language disorders (Buchwald, et al., 2007; Namasivayam, et al., 2013) to understand how certain sound clusters (Adi-Bensaid & Ben- David, 2010; Chang, 2004; Mildner & Tomić, 2010) and neutralized and altemated voicing (Zamuner, et al., 2006) are acquired. It is argued that such phonological phenomenon is useful as a means through which psychoneurolinguists could understand specific language impairments (Aguilar-Mediavilla, et al., 2002; Hansson & Nettelbladt, 2002; Joanisse & Seidenberg, 1998) and specific learning difficulties (Gupta, 2004; Maïonchi, et al., 2013; Post, et al., 1999; Ramus, 2001).

Organizing the relationship ought to be drawn between phonetic and phonology from one side and psychoneurolinguistics from another side, Hall (2006) has listed two types of inserted vowels (i.e., not underlying) should not be ignored from any discussion: Excrescent vowels (result of phonetic intrusion) and epenthetic vowels (part of a phonological repair). This suggestion has received high welcome by other researchers (Fougeron & Ridouane, 2008; Plug et al., 2019). In fact, studies that followed were dedicated to investigate the effectof changing rates on inserted vowels where existing data suggest that the productivity of speech rate (Gay, 1981).

Similar to Korean (Kim, 2017), ADY has its own phonation system in plosives (lenis, aspirated and fortis) but with and without voicing contrast; where sometimes phonemic changes in ADY require inevitable and unavoidable alterations (e.g., substitution) in the word. To illustrate, a given verb from central dialect of ADY like the verb 'kulaynih' (SA plural masculine and feminine imperative verbal sentence 'kulnah' (=eat it), for example, would generate closing diphthongs /aɪ/ and substitution of the short vowel /ə/ with the short vowel /ɪ/. An insertion-substitution characteristic could also be seen in the northern dialect where verb like 'ji'at' (SA of you came) would produce a substituted long vowel /i:/ instead of the short vowel /ə/ and another vowel to be attached as an inserted vowel (closing diphthong) after the final syllable /aʊ/ to form the verb 'Jītāw' /ji:taʊ/ (SA past simple form of the verb 'came').

Some studies showed that phonemic changes, stripped of lexical syllabification, are mainly processed by the auditory centers, whilst the processing of code takes place in-between productive language and receptive language (Davis & MacNeilage, 1990; McAuliffe, et al., 2007; Nakeva, et al., 2015; Romani, et al., 2002; Verhoeven, et al., 2016). These findings, showing diagnostic differentiation of processing based on vowel insertion and other phonemic complexity, are in accord with understanding relationship between syndromes and hearing impairments (Flagg, et al., 2005; Haapala, et al., 2014; Schiff-Myers & Klein, 1985).

1.1. The Present Study

As with vowel lengthening in Arabic dialect of Yemen (ADY) being investigated in previous article, so also with the feature of vowel insertion the question arises as to the role played by educational, yet linguistic background in differing those who are inserting vowels in their oral speech contexts from those who are not. Also, in recent years, even though there is increasing research on psychoneurolinguistic problems including speech disorders, language deficits, specific language difficulty and specific learning impairments, none of them focuses on the production and perception of the vowel system in ADY in terms of what the production and perception results add to our understanding of these problems.

Methodology

Methodical Processes

Materials

Set of multisyllabic words were hidden in contextual content and were ought to be spontaneously articulated by speakers from ADY as a reaction to a seven-minute video. Based on how their standard Arabic is strong, participants had two choices to deal with the targeted phonemic changes under investigation: Either to prove solid Arabic background to avoid inserting vowels or to show lack in that background and insert these vowels.

2.1. Speakers and Dialects

One thousand and seven hundred Yemeni male participants (age: 19-61) were engaged in an expressive task.

Participants were broadly categorized into educated and uneducated speakers and were preassigned as per their regional parts into five dialectal groups:

- G.1. 324 Participants (186 educated and 138 un educated) from northern dialects of Yemen.
- G.2. 276 Participants (66 educated and 210 uneducated) from southern dialects of Yemen.
- G.3. 212 Participants (98 educated and 114 uneducated) from eastern dialects of Yemen.
- G.4. 296 Participants (106 educated and 190 uneducated) from western dialects of Yemen.
- G.5 592 Participants (214 educated and 378 uneducated) from central dialects of Yemen.

2.3. Processing and Analysis

The participants in this study are the same participants who participated in the vowel lengthening study. These participants watched video scene for seven minutes provided to them by interviewers who asked questions related to the scene they have already watched. Recordings were then analyzed by a phonetician and a phonologist who used transliteration in decided to the Romanization of the library of congress (Bhargava, et al., 2012) and English translation to describe participants' speech before they analyze it linguistically. Participants' performance was then statistically manipulated and visualized thus that the reader could have a full picture of the phenomenon under investigation.

Results Vowel Insertion in Arabic Dialect of Yemen

3.1. Linguistic Evidence from Educated and Uneducated Speakers

This article is an attempt to answer the following question: Is vowel insertion in the speech of individuals from Arabic dialect of Yemen (ADY) likely to be used as a standardized criterion to differentiate educated speakers from uneducated ones? Insights to answer this question are provided on the basis of an analysis of empirical data derived from dialectal speech ofparticipants from five local languages (referred to as dialects here) under the ADY that functions as an umbrella for all these spoken and/ or popular languages in Yemen.

The researchers argue that vowel insertion in ADY is a result that is mixed of phonetic excrescence and the phonologization of vowels, and is related to factors including tense-lax vowel pairs (Cox, 2006) and stress (Haas, 1977a) that would generate vowel insertion in its original phonemic state. The link to sociolinguistic factors provides a unified account that addresses both the dialectal and phonological distribution of the phenomenon.

3.1.1. Northern Dialect

In the northern dialect, a total of hundred and fifty three out of hundred and eighty six educated participants vs. hundred and thirty three out of hundred and thirty eight uneducated participants have inserted vowels while the rest from the two subgroups did not. There are, however, many examples from different spoken languages of the northern dialect to illustrate vowel insertion like is seen in Ṣan'aānī'local language (a variety of the northern dialect), for example.

Ṣan'aānī' participants found to alternatively insert closing diphthong /aɪ/ in the final syllable of the verb 'Jalasa' (= He sat down) if that verb comes after a subject of third person plural feminine pronoun regardless of the type of tense (present or past) and/or the conjugative form (inflexional or derivational) being used; thus, the standard Arabic (SA) verb 'jalasna' (=They (females) sat down) has been articulated 'jilisayn' by these participants. It should be noted here that such phonemic feature displays with that of other spoken languages of the central dialect.

It has been observed also that Ṣan'aānī's participants insert short vowel /ɪ/ in the final syllable of the verbs and the verb 'shirbatih' (=She (the girl) drank it (pounced as 'sharibath' in SA) is a good example. This insertion feature applies to that of the local accent of Ṣa'adah (another variety of the northern dialect) both in the present as well as in the past form of the verb as is obviously seen in the dialectal speech of the participants (e.g., 'yel'abayn' and 'li'abayn' (=They (e.g., girls) play, played, respectively) but not to 'Amrāni local language (one more variety of the northern dialect) where short vowel /æ/ is inserted instead (e.g., 'yel'aban' and' li'aban').

Captivatingly, long vowel /u:/ in northern dialect is inserted in plural context where its existence is not necessary in ADY and incorrect in SA and this is seen in the utterances of participants from Ḥajjah in words like 'kānū' (=They were) in sentences like kānū al- awalīn…' (=Forefathers were.) to mean 'kān (a) al awalūn…' in SA. It should be noted herethat such phonemic feature is not restricted to Hajjah's local language but extends to include all local accents in the northern dialect of the ADY.

3.1.2. Southern Dialects

As is stated earlier, dialects within the Arabic dialect of Yemen (ADY) were divided into five groups of which southern dialect is the second group in this sociolinguistic categorization after the northern dialects. In this group, forty six out of sixty-six educated participants vs. two hundred and one out of two hundred and ten uneducated participants from southern dialect of Yemen have inserted vowels while the rest of the two subgroups did not.

Local languages in the southern dialect like those of Abyan, Laḥj and Al Ḍale 'a insert both short vowels /æ/ and /ʊ/ in their dialectal accents and this can be clearly seen in participants' multisyllabic utterances like 'shirbannah', 'shirbunnah', (=They (third person plural feminine) drank it) for the standard Arabic (SA) verb 'sharibnah'. Distinguishing themselves from other speakers of other dialects, participants of Al Ḍale 'a insert long vowel /i:/ in utterances like 'malyānīn' (=They are full), and this insertion is so far unnecessary and as is already said, does not exist in other dialects wherein this verb is articulated without this vowel length, yet extra syllable addition ('malyān'). Finally, Laḥji participants insert short vowel /ɪ/ in their dialectal speech and this is clear in utterances like 'Laḥij' (=Laḥj, the city). Unlike participants of these local languages, 'Adanī' (another variety of the southern dialect) speakers insert short vowel /ʊ/ in the final syllable and this is more seen in the utterances of many educated participants than in those of uneducated participants (e.g., 'ghayarunnuh' (= They have changed it). However, the case is not the same with the long vowel /u:/ that was seen to be inserted in the final syllable (e.g., 'ghayarunnū') more by uneducated participants than educated ones. Note here that insertion of the long vowel /u:/ was accompanied by deletion of mute sound /h/.

Long vowel /i:/ is inserted by 'Adanī' participants and this is obvious in their utterances of words like 'mīn'(=Who). Such insertion can also be found in central dialect, namely Ta'izi local language. Similarly, long vowel /a:/ was

inserted in ‘Adanī’ local language and participants’ utterances of words like ‘lāqaw’ (=They found) articulated more by uneducated speakers is a good example of this type of vowel insertion.

3.1.3. Eastern Dialect

Eastern dialect is methodologically classified as the third of Arabic dialect of Yemen (ADY) following the northern and southern dialects. In this dialect, seventy seven out of ninety-eight educated participants vs. hundred and three out of hundred and fourteen uneducated participants inserted vowels from eastern dialects of Yemen while the rest from the two subgroups did not.

Short vowels’ insertion has been observed in the tongue accent of the participants of Ḥaḍramūt (a spoken language of the eastern dialect) where, in a verb like ‘qaman’ (= They stood up), the participants inserted a short vowel /æ/ between the consonants ‘m’ and ‘n’ of the verb that is pronounced ‘qomna’ in Standard Arabic (SA), which sheds lights on the relationship between phonemic change and nasalization that have been investigated in some languages like Korean (Ahn, 2008; Hong, 2006; Jun, 2015; Kim, et al., 2002; Kook, et al., 2005; Lee & Lee, 2006) and Greek (Haas, 1977b). In Shabwah local language (another popular language of the eastern dialect), participants insert long vowel /u:/ in the final syllable of their words as is seen in their articulation of the verb ‘play’ when using it with subject of the third person plural feminine ‘ Yel‘abūn’ (=They play). This long vowel /u:/ does not exist in SA where this verb with the same pronoun is produced ‘Yal‘abna’.

3.1.4. Western Dialects

Western dialect is the fourth member in the family of Arabic dialect of Yemen (ADY). In this dialectal group, eighty six out of hundred and six educated participants vs. hundred and seventy nine out of hundred and ninety uneducated participants inserted vowels while the rest from the two subgroups did not.

Short vowel /æ/ is inserted in the final syllable of words of some western dialects like those of Ḥodaydī variety of the western dialect and is occurred with the subject of the third person feminine plural ‘shirbannuh’, (they (girls) drank it (the juice), supposed to be articulated ‘sharibnah’ in SA. Speakers of Raymah local language insert short vowel /ɪ/ in their utterances and this is clearly seen in words like ‘wassilih’ (= Connect it) that does not exist in SA where it is pronounced ‘wassilh’ and this production is equally produced both by educated and uneducated participants. This characteristic feature that takes place in the final syllable of multisyllabic utterances goes with that of Ṣan‘aānī local language of the northern dialect.

3.1.5. Central Dialects

The group of the central dialect is the last group under the categorical classification of Arabic dialect of Yemen (ADY). In this group, hundred and seventy-four out of two hundred and fourteen educated participants vs. three hundred and sixty-five of three hundred and seventy-eight uneducated participants inserted vowels while the rest of the two subgroups did not. In standard Arabic (SA) verbs like ‘shariba’ (drank), ‘haraba’ (ran), ‘sami‘aa’ (heard) and ‘aftaj‘aa’ (freaked out), participants of the spoken language of Dhamār found to insert a short vowel /æ/ and closing diphthongs /aɪ/ when they use these verbs in sentences either in past and/ or in the present tense form (e.g., ‘shirbanneh’ and ‘ yishrabanneh’; and ‘shirbayneh’ and ‘yishrabayneh’ as for Standard Arabic (SA) ‘sharibnah’ and ‘yashrabnah’ (they drank/drink it).

Grammatically speaking, no insertion process is undertaken to the verb (shariba) in Dhamārī local language of the central dialect except when that verb is used with the dual person feminine and third person plural feminine pronouns. Consider:

Table 1: SA vs. Dhamāri Local Language of the Central Dialect: Second and Third Person Pronouns and Vowel Insertion.

Type of Pronoun	SA Example	Dhamāri Local Lang.	Type of linguistic Change	Vowel at question
Dual person feminine	Sharibatah (The two girls/women drank it).	shirbaynih	Vowel Insertion	/aɪ/
3rd person plural feminine	Sharibnah (They (girls/women) drank it).	shirbaynih	Vowel Insertion	/aɪ/

Ibbī and Ta‘izī local languages (popular languages of the central dialect) have their own phonemic features. In the utterances of participants from both spoken languages, one can easily notice how the short vowel /ʊ/ is inserted in the verb ‘shariba’, when that verb is used in the case of a third person singular feminine pronoun (she). Compare:

- SA: Sharibath = She drank it (water or any other liquid).
- Ibbi and Ta‘izī local languages: Shiribtuh.

Short vowel /æ/ is another distinctive phonemic feature of Ibbī local language. Such feature can be clearly seen in verbs like (shirbannah) where Ibbī local language shares Ṣan‘aānī local language of the northern dialect this short vowel /æ/ insertion.

Closing diphthong /aɪ/ is inserted in utterances of central dialect participants from different regions and verbs like ‘sim‘ayn’, (they (zebras) heard) (articulated ‘sami‘ana’ in SA), and ‘shirbayn’, (they drank) (articulated ‘sharibna’ in SA). This rule also applies to the same verbs in the present tense form. Consider:

- ‘Yeshrabayn’, (they (girls) drink).
- Yesma‘ayn’, (They (zebras) hear.).

Long vowels /i:/ and /a:/ are inserted in Ibbī and Dhamāri local languages in negative forms and this type of insertion takes place at the end of the word that follows the negative article. Such rule of negation does not exist in SA after the particles (conditional pronouns which introduce the verb in the jussive case) of which ‘Lam’ is the most commonly used. Compare:

Table 2: Vowel Insertion after Negation in SA and central dialect: Comparison.

Cases / Language/ Dialect	Affirmative	Negative	Meaning
SA	Yartʿaī	Lam Yartʿa	It grazed/ It didn't graze.
Ibbi local language	Yertʿaī	Martaʿaī	It grazed/ It didn't graze.
Dhamāri local language	Yertʿaī	Martaʿaā	It grazed/ It didn't graze.

As is seen in Table 2, the two long vowels /i:/ and /a:/ that were inserted in the central dialect of ADY are omitted in SA due to specific grammatical negation rules.

3.2. Educated vs. Uneducated Speakers of Arabic Dialect of Yemen: Descriptive Analysis

Having the participants preassigned into five groups of speakers according to dialectal categorization and sociolinguistic and demographical backgrounds and getting their linguistic performance analyzed, the third step was to manipulate their results statistically. The reason behind statistical analysis and data visualization is to provide the reader with clearer picture and better understanding of the findings. In addition, the researchers believe that statistical procedure is sufficiently enough to complete the mission of the linguists. Descriptive statistics were used to find out the differences between and among groups to see how significant they are and what contribution do these differences add to science. Consider:

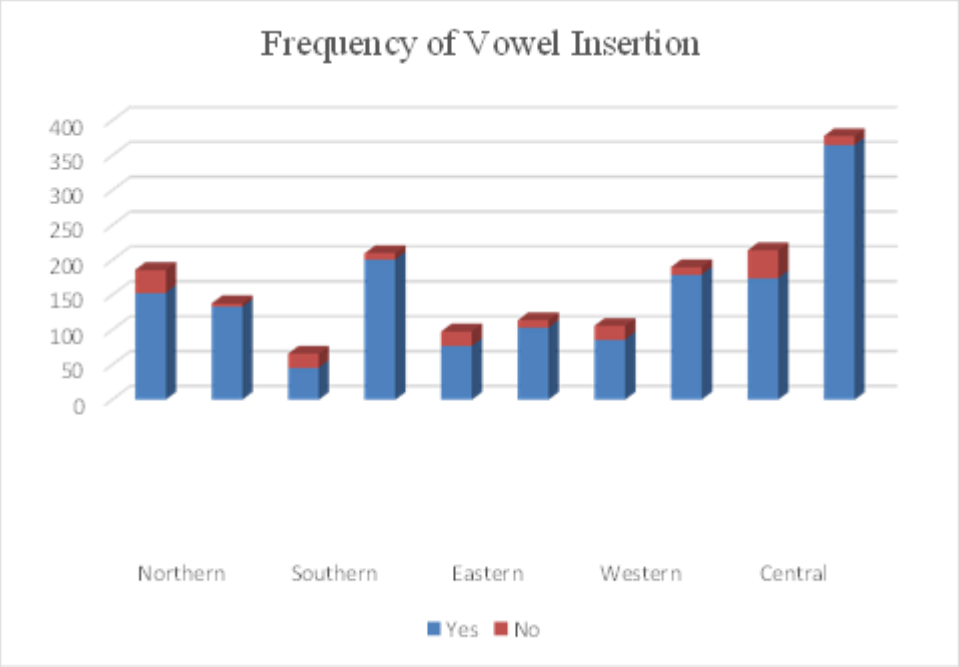

Fig. 1: Educated vs. Uneducated Speakers of Arabic Dialect of Yemen: Descriptive Analysis of the Frequency of Vowel Insertion

Chi-square tests were performed to test if there is difference between educated and uneducated participants in vowel insertion for each Yemeni part. There were significant group differences in vowel insertion with ($p -$ values < 0.001) regrading to each Yemeni Parts.

Discussion and Conclusion

Interpretation of the Results

This study explores vowel insertion in Arabic dialect of Yemen (ADY). Several tendencies emerge from the distribution of vowel insertion in existing Yemeni words. Most, but not all, of the factors related to vowel insertion are mirrored in the results of sociolinguistic movements and demographical and anthropological changes (Maddieson, 1985), suggesting syllabification and segmental changes. Except of that of Al Yaari, et al., (2012, 2022) and Machajdíková & Buzássyová (2021), the observed data vs. phonetic and phonological studies are also attributed to the lack of a perceptual basis for the tendency under investigation. Furthermore, in the present study, two patterns of vowel insertion (both from monophthongs and diphthongs) were identified by implementing acoustic distinctions (Johnson & Martin, 2001; Nokes & Hay, 2012) that found to be relative.

Specifically, speakers of ADY insert short monophthong vowels (short vowels /æ/, /ɪ/, and /ʊ/ and long vowels /a:/, /u:/, and /i:/) and closing diphthong /aɪ/ in their dialectal speech where vowels in multisyllabic words were inserted more by uneducated than educated speakers (133 of 138 vs. 153 of 186 from northern dialect; 201 of 210 vs. 46 of 66 from the southern dialect; 103 of 114 vs. . 77 of 98 from the eastern dialect; 179 of 190 vs. 86 of 106 from the

western dialect; and 365 of 378 vs. 5 174 of 214 from the central dialect) due tothat dialectal influence (sociological factor) outperforms grammatical and or syntactic rules (linguistic factor) (Sakarna, 2013). The following table summarizes these findings. Consider: **Table 2** Vowels and diphthongs' insertion in ADY: Distinctive Features

ADY		Vowel Insertion			
		Monophthongs		Diphthongs	
Per Region	**Per Cities**	**Long vowels**	**Short vowels**	**Closing**	**Centering**
Northern Dialect	Sana'aā		/ɪ/	/aɪ/	
	Sa'adah			/aɪ/	
	'Amrān		/æ/		
	Ḥajjah	u://			
Southern Dialects	'Adan	/i:/, /u:/	/ʊ/		
	Laḥj	/æ/, /ʊ/	/ɪ/		
	Al Ḍale'a	/i:/, /æ/, /ʊ/			
	Abyan	/æ/, /ʊ/			
Eastern Dialect	Ḥaḍramūt		/æ/		
	Shabwah	/u:/			
Western Dialects	Ḥodaydah		æ		
	Raymah		/ɪ/		
Central Dialects	Dhamār	/a:/	/æ/	/aɪ/	
	Ibb	/i:/	/ʊ/	/aɪ/	
	Ta'izī	/i:/	/ʊ/	/aɪ/	

As is seen
in Table 2, insertion nearly covers short and long vowels as well as closing diphthongs and vowel insertion spreads widely across all ADY. Psychoneurolinguistically, the vowel insertion phenomenon being investigated during this study appears promising as an early intervention for assessing individuals' language be it the language they acquire (Babatsouli & Sotiropoulos, 2018; Demuth, et al., 2006; Salameh, et al., 2003; Topbas, 1997) or the language aspects they are prone to suffer from (Jame, 2001; Mason, et al., 2015).

Even though findings are of normal to well above average cognitive ability participants, they help understand the dynamics of language communications which, in turns, enable experts in the field to interpret certain linguistic phenomena including language delay (Peter, et al., 2017), speech sound disorders (Luzzini-Seigel & Murray, 2017; Marquardt, et al., 2002; Munson, et al., 2003; Namasivayam, et al., 2002), developmental language disorders (Güven & Leonard,2020) and aphasia (Buchwald, 2009) in children that are frequently the victims of inaccurate diagnosis as a result.

4.1. Recommendation

Conclusions drawn from this study encourage researchers to recommend benefitting from them to understand linguistic distinctive features of ADY. They can also be implemented as a launching pad through which other researchers could use to understand similar phonetic and phonological phenomena in other Arabic dialects of similar and/ or the same sociolinguistic nature as that of ADY. The study also recommends further research on the integrated relationships among vowel substitution (Kirk,2008) , vowel deletion (Al Yaari, et al., 2012) and vowel lengthening (Al Yaari, et al., 2022) to finish the investigation that other researchers have started (Allison, 2017; Baković, 2019; Glowacka, 2001; Kim, 2009).

Future research is also warranted to examine the effectiveness of the vowel inserted by typically developing individuals of Yemen in their dialectal speech in the process of diagnosis and treatment of individuals demonstrate linguistic deficits in other social communities (Ammar, et al., 2006; Çapan, 1998; Grinstead, et al., 2008; Kornev, et al., 2010; Toohill, et al., 2012) and academic situations (Mediavilla, 2002).

4.2. Limits for Future Research on Arabic Dialect of Yemen

Outcomes of this study are limited to the Arabic dialect of Yemen (ADY) spoken in Yemeni regional parts the participants belong to. If there are any limitations these reflect gaps in the research literature, it is due to that phonetic and phonological phenomena like the one at hand are not yet explored in Arabic dialects and/or in ADY.

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