International Journal of Business, Human and Social Sciences
ISSN: 2517-9411
Vol:13, No:9, 2019

Uvulars Alternation in Hasawi Arabic: A Harmonic Serialism Approach

Huda Ahmed Al Taisan

Abstract**—**This paper investigates a phonological phenomenon, which exhibits variation 'alternation' in terms of the uvular consonants [q] and [ʁ] in Hasawi Arabic. This dialect is spoken in Alahsa city, which is located in the Eastern province of Saudi Arabia. To the best of our knowledge, no such research has systematically studied this phenomenon in Hasawi Arabic dialect. This paper is significant because it fills the gap in the literature about this alternation phenomenon in this understudied dialect. A large amount of the data is extracted from several interviews the author has conducted with 10 participants, native speakers of the dialect, and complemented by additional forms from social media. The latter method of collecting the data adds to the significance of the research. The analysis of the data is carried out in Harmonic Serialism Optimality Theory (HS-OT), a version of the Optimality Theoretic (OT) framework, which holds that linguistic forms are the outcome of the interaction among violable universal constraints, and in the recent development of OT into a model that accounts for linguistic variation in harmonic derivational steps. This alternation process is assumed to be phonologically unconditioned and in free variation in other varieties of Arabic dialects in the area. The goal of this paper is to investigate whether this phenomenon is in free variation or governed, what governs this alternation between [q] and [ʁ] and whether the alternation is phonological or other linguistic constraints are in action. The results show that the [q] and [ʁ] alternation is not free and it occurs due to different assimilation processes. Positional, segmental sequence and vowel adjacency factors are in action in Hasawi Arabic.

Keywords**—**Harmonic serialism, Hasawi, uvular, alternation.

I. Introduction

THIS paper investigates the consonantal variation 'alternation' of the uvular [q] and [ʁ] in Hasawi Arabic (HA). It is a variety of Arabic that is spoken in the Eastern province of Saudi Arabia. This dialect is also known as one of the Gulf Arabic (GA) dialects spoken in the Arabic Gulf countries, i.e. Kuwait, Bahrain, The UAE, Qatar and Oman [1], [2]. This paper is part of a broader research of the uvulars alternation in HA.

In the literature, scholars have observed and reported the alternation of the uvulars [q] and [ʁ] in GA dialects. The remarks and analyses of the alternation of [q] and [ʁ] present three assumptions. First, since no alternation pattern has been found, the phenomenon is considered a free variation in [3]-[7]. Second, religion-related words and classical ones preserve the /q/ sound and do not alternate with /ʁ/ in [5], [8]. Third, the alternation of [q] and [ʁ] is governed, but purely by social factors, i.e. age, gender, education and style. There are not phonological factors that stipulate the alternation in [9]-[11].

This paper aims to provide a phonological evidence that the alternation of the uvulars [q] and [ʁ] is not a free variation phenomenon. In fact, there is a pattern and phonological rules that govern this alternation and specific environments that prefer one segment to surface above the other. These rules are illustrated in the analysis of the collected data through the HS-OT approach [12].

Huda Ahmed Al Taisan is with the University of Essex, UK (phone: +44 7479517310; e-mail: haaalt@essex.ac.uk).

II. Methods

A. Participants

The participants are ten native speakers of HA. They are from the same linguistic background. Their ages range from 20 to 45. They have no speech or hearing impairments.

B. Data Collection and Procedures

This study is unique in the way the data were collected. Multiple interviews were carried out with the participants. The interviews were audio recorded using Praat, the speech analysis software. The interviews were conducted in a naturalistic style and were drawn from narratives of the speakers' personal experiences or interactions with other speakers. The forms that included the investigated sound /q/ and /ʁ/ were extracted and classified. Subsequently, additional forms were collected from social media to complement the list of forms.

III. Cases of the Uvulars Alternation in HA

A. Cases of /q/ → /ʁ/ Alternation in HA

From the data collected in this study, it was observed that the consonant /q/ is still active in the HA dialect and not only for religious reasons or forms which are mentioned in previous works [5], [8]. There are colloquial and widely used words in HA that preserve the segment /q/ and show no alternations of it. However, there are cases where /q/ exhibits alternations due to different phonological processes such as voice assimilation and manner of articulation assimilation.

TABLE I
Examples of /q/→/ʁ/ Alternation in HA

/qiθa:rah/	[ʁitθa:rah]	"guitar"
/taqri:ban/	[taʁri:ban]	"almost"
/qana:h/	[ʁana:h]	"channel"

In Table I, it is illustrated that an underlying /q/ surfaces as /ʁ/ in three instances. First, in the example /qiθa:rah/ "guitar", /q/ comes in a word-initial *onset* position followed by a high-

front vowel /i/, which triggers the change from /q/ in /qiθa:rah/ to [ʁ] in [ʁiθa:rah]. Second, in /taqri:ban/ "almost", /q/ comes in a word-medial *coda* position followed by a voiced and continuant segment /r/, which triggers the change from /q/ in /taqri:ban/ to [ʁ] in [taʁri:ban]. Finally, in /qana:h/ "channel", /q/ comes in a word-initial *onset* position followed by a low-front vowel /a/, which triggers the change from /q/ in /qana:h/ to [ʁ] in [ʁana:h].

B. Cases of /ʁ/ → /q/ Alternation in HA

The consonant /ʁ/ also shows an alternation behavior in HA. This is due to different phonological processes such as voice assimilation '*devoicing'* and manner of articulation assimilation.

TABLE II
EXAMPLES OF /ʁ/→/q/ ALTERNATION IN HA

/ʁɑ:zi/	[qɑ:zi]	"gassy"
/lʁu:d/	[lqu:d]	"jowls"
/sˤuʁɑh /	[sˤuqɑh]	"souvenir"
/ðˤɑʁtˤ/	[ðˤɑqtˤ]	"pressure"

Table II illustrates that an underlying /ʁ/ surfaces as /q/ in four instances in HA. First, in the example /ʁɑ:zi/ "gassy", /ʁ/ comes in a word-initial *onset* position followed by a low-back vowel /ɑ/, which triggers the change from /ʁ/ in /ʁɑ:zi/ to [q] in [qɑ:zi]. Second, in /lʁu:d/ "jowls", /ʁ/ comes in an initial consonant cluster /lʁ/, which triggers the change from /ʁ/ in /lʁu:d/ to [q] in [lqu:d]. Third, in /sˤuʁɑh/ "souvenir", /ʁ/ comes in the vicinity of an emphatic segment /sˤ/ preceded by the high-back vowel /u/ and followed by the low-back vowel /ɑ/, which triggers the change from /ʁ/ in /sˤuːʁɑh/ to [q] in [sˤu:qɑh]. Finally, in /ðˤɑʁtˤ/ 'pressure", /ʁ/ comes in a coda consonant cluster /ʁtˤ/ and in the vicinity of an emphatic segments /ðˤ/ in the onset and /tˤ/ in the complex coda, this triggers the change from /ʁ/ in /ðˤɑʁtˤ/ to [q] in [ðˤɑqtˤ].

IV. UVULARS ALTERNATION FROM HS-OT PERSPECTIVE

In this study, the collected data are analysed within the framework of HS-OT, which accounts for the alternation process in a gradual and a harmonic multiple steps [12].

The classical framework of OT is parallel. This means that forms may include multiple phonological processes; the derivational process in Classic OT is limited by one single derivation through GEN and EVAL producing the optimal output [13]. This cannot explain what changes happen, when they happen and how.

HS-OT allows for the production of intermediate outputs in several steps with one optimal output in each step. The constraints are ranked strictly. The output of one step is the input to the next derivational step. In every derivational step, the intermediate output must differ from its input harmonically and gradually. The derivational process keeps going in loops until there are no further harmonic improvements to be made to the optimal output. Finally, when the last output is the same as its input, the ultimate derivational step, the convergence, applies. When all of these steps have occurred, the derivational process is complete [12].

A. Alternation of /q/ → [ʁ] from HS-OT Perspective

The alternation of /q/ → [ʁ] involves two phonological processes: voicing and manner of articulation assimilation. These processes occur gradually and with one harmonic change in each step. /q/ undergoes voice assimilation in the vicinity of front vowels and voiced segments. The manner of articulation assimilation involves a change or loss of specific manner features of the target segment /q/ triggered by the front vowels /a/ and /i/ or by the /r/, the alveolar approximant.

TABLE III
HS-OT ANALYSIS OF / taqri:ban / → [taʁri:ban]

/taqri:ban/ → [taʁri:ban]	AGREE [VOICE]	HAVE VOICE	MAX-IO [VOICE]	NOLINK [VOICE]	AGREE [CONT]	HAVE MANNER	MAX-IO [CONT]	NOLINK [CONT]
(1) Voice Assimilation /taqri:ban/→ [taUVFri:ban]								
a. /taqri:ban/	*!							
☞b. /taUVFri:ban/		*	*					
(2) Voice Assimilation /taUVFri:ban/→ [taɢri:ban]								
a. /taUVFri:ban/		*!						
☞b. /taɢri:ban/			*	*				
(3) Manner of Articulation Cont. Assimilation /taɢri:ban/→ [taUCFri:ban]								
a. /taɢri:ban/					*!			
☞b. /taUCFri:ban/						*	*	
(4) Manner of Articulation Cont. Assimilation /taUCFri:ban/→ [taʁri:ban]								
a. /taUCFri:ban/						*!		
☞b. /taʁri:ban/							*	*
(5) Convergence								
a. /taʁri:ban/								

In the alternation of /q/ → [ʁ], stress and position are not active factors in HA. This alternation occurs in stressed and unstressed syllables as well as in onset and coda positions. Table III shows the /q/ → [ʁ] alternation from HS-OT perspective using the example /taqri:ban/ → [taʁri:ban]. The mapping from the underlying form to the final surface form

undergoes five stages of derivations. There are two processes of phonological derivations in action: voice assimilation and manner of articulation assimilation processes.

The acronym "UVF" refers to unspecified [Voice] feature whereas "UCF" refers to unspecified [Cont.] feature. The first step shows that candidate (a) is ruled out since it violates the highly ranked constraint AGREE [VOICE] by having different specifications of the feature [Voice], i.e. /q/ has [-Voice] feature while /r/ has [+Voice] feature. Candidate (b) is the winner at this step. Although it violates the low ranked constraint MAX-IO [VOICE] by having no [voice] specification for the coda of the first syllable /q/, it does not violate the highly ranked constraint AGREE [VOICE].

The second step shows the addition of two constraints. In order for the next step to occur, a [Voice] feature specification constraint is added, i.e. HAVE VOICE, which outranks MAX-IO [VOICE]. As a result, candidate (a) is ruled out and candidate (b) is the optimal output, which violates the lowest ranked added constraint NOLINK [VOICE], but satisfies a higher constraint.

The third step shows the second process of the phonological derivations of this example, which is the manner of articulation assimilation. This step shows the addition of two constraints in order for the second process to occur: AGREE [CONT] and MAX-IO [CONT]. Candidate (a) loses since it violates AGREE [CONT]. However, candidate (b) is the optimal output in this step since the voiced uvular stop /ɢ/ loses its specification of the feature [-cont.], which violates the low ranked MAX-IO [CONT], but satisfies the higher ranked constraint AGREE [CONT].

In order for the next step to occur, the fourth step, a manner specification constraint is added, i.e. HAVE MANNER, which outranks MAX-IO [CONT]. Therefore, candidate (a) is ruled out and candidate (b) is the optimal output, which violates the lowest ranked added constraint NOLINK [CONT], but satisfies a higher constraint.

The fifth step shows the convergence stage in which the final output can undergo no additional harmonic improvements. As a result, the input in the final step is the optimal output. Table III and the ranking of the constraints below show the complete harmonic improvement steps that /taqriːban/ underwent to surface as [taʁriːban]: AGREE [VOICE] >> HAVE VOICE >> MAX-IO [VOICE] >> NOLINK [VOICE]>> AGREE [CONT] >> HAVE MANNER >> MAX-IO [CONT] >> NOLINK [CONT]. For a full list of the constraints presented, see appendix.

It is worth mentioning that from the example illustrated in Table III, the initial order of these two phonological processes is established in this example. Primarily, the forms in GEN are supposed to differ from the input in one change [12]. Therefore, the winner is (b) in the first step where it loses the voice feature specification [-voice] only to gain the [+voice] feature specification in the second step, while also assimilating to the adjacent segment in the feature [voice]. As a result, the first process is voice assimilation. A manner of articulation assimilation process that is achieved in two steps then follows it. In the third step, the voiced uvular stop /ɢ/ loses its manner of articulation [-cont.] feature specification. Then, the candidate gains the [+cont.] feature specification in the fourth step. At this stage, the ranking of the assimilation processes for uvulars in HA is as follows: Voice assimilation >> manner of articulation assimilation.

B. Alternation of /ʁ/ → [q] from HS-OT Perspective

The alternation of /ʁ/ → [q] also involves two phonological processes: voicing and manner of articulation assimilation. These processes occur gradually and with one harmonic change in each step. /ʁ/ undergoes voice assimilation *'devoicing'* in the vicinity of back vowels and voiceless segments. The manner of articulation assimilation involves a change or loss of specific manner features of the target segment /ʁ/ triggered by the back vowels /ɑ/ and /u/ or by the adjacent emphatic segments /sˤ/, /tˤ/or /ðˤ/.

TABLE IV
HS-OT ANALYSIS OF /ðˤɑʁtˤ/ → [ðˤɑqtˤ]

/ðˤɑʁtˤ/ → [ðˤɑqtˤ]	AGREE [VOICE]	HAVE VOICE	MAX-IO [VOICE]	NOLNK [VOICE]	AGREE [CONT]	HAVE MANNER	MAX-IO [CONT]	NOLINK [CONT]
(1) Voice Assimilation /ðˤɑʁtˤ/→ [ðˤɑUVFtˤ]								
a. /ðˤɑʁtˤ/	*!							
☞b. /ðˤɑUVFtˤ/		*!	*					
(2) Voice Assimilation /ðˤɑUVFtˤ/→ [ðˤɑχtˤ]								
a. /ðˤɑUVFtˤ/		*!						
☞b. /ðˤɑχtˤ/			*	*				
(3) Manner of Articulation Cont. Assimilation /ðˤɑχtˤ/→ [ðˤɑUCFtˤ]								
a. /ðˤɑχtˤ/					*!			
☞b. /ðˤɑUCFtˤ/						*	*	
(4) Manner of Articulation Cont. Assimilation /ðˤɑUCFtˤ/→ [ðˤɑqtˤ]								
a. /ðˤɑUCFtˤ/						*!		
☞b. /ðˤɑqtˤ/							*	*
(5) Convergence								
a. /ðˤɑqtˤ/								

In the alternation of /ʁ/ → [q], stress and position are not active factors in HA. This alternation occurs in stressed and unstressed syllables as well as in onset and coda positions. Table IV demonstrates the /ʁ/ → [q] alternation from HS-OT perspective of the example /ðˤɑʁtˤ/ → [ðˤɑqtˤ]. The mapping from the underlying input form to the optimal output form undergoes five derivational stages. Two processes of phonological derivations are in action: voice assimilation and manner of articulation assimilation.

The first step shows that candidate (a) is ruled out since it violates the highly ranked constraint AGREE [VOICE] by having different [Voice] feature specifications. /ʁ/ has [+Voice] feature whereas /tˤ/ has [-Voice] feature. Candidate (b) is the winner at this step. Although it violates the low ranked constraint MAX-IO [VOICE] by having no [voice] specification for the first segment in the coda cluster of the /ʁ/, it does not, however, violate the higher constraint AGREE [VOICE].

Two constraints are added in the second derivational step. In order for the next step to occur, a [Voice] feature specification constraint is added, i.e. HAVE VOICE, which outranks MAX-IO [VOICE]. As a result, candidate (a) is ruled out and candidate (b) is the optimal output. Although it violates a lower constraint NOLINK [VOICE], it also satisfies a higher constraint.

The third step illustrates the second process of the phonological derivations of this example, which is the manner of articulation assimilation. This step shows the addition of two constraints in order for the second process to occur: AGREE [CONT] and MAX-IO [CONT]. Candidate (a) loses since it violates AGREE [CONT]. On the other hand, candidate (b) is the optimal output in this step since the voiceless uvular fricative /χ/ loses its specification of the feature [+cont.], which violates the low ranked MAX-IO [CONT], but satisfies the higher ranked constraint AGREE [CONT].

In order for the fourth step to occur, a manner specification constraint is added, i.e. HAVE MANNER, which outranks MAX-IO [CONT]. Therefore, candidate (a) is ruled out and candidate (b) is the optimal output. It violates the lowest ranked added constraint NOLINK [CONT], but satisfies a higher constraint.

The fifth step shows the convergence stage in which no additional harmonic improvements to the final output are possible. Consequently, the input in in the final step is the final optimal output. Table IV and the ranking of the constraints below show the complete harmonic improvement steps that /ðˤɑʁtˤ/ underwent to surface as [ðˤɑqtˤ]: AGREE [VOICE] >> HAVE VOICE >> MAX-IO [VOICE] >> NOLINK [VOICE] >> AGREE [CONT] >> HAVE MANNER >> MAX-IO [CONT] >> NOLINK [CONT].

From the examples illustrated in Table IV, the order and ranking of the two phonological processes, voice and manner of articulation assimilation, is confirmed in HA. In each derivational stage, the forms generated by GEN differ from the input by one minimal change at a time [12]. As a result, the winner in the first step is candidate (b) where it loses the voice feature specification [+voice] only to gain the feature specification [-voice] in the second step while assimilating to the adjacent segment /tˤ/ in the feature [voice]. Thus, the first process is voice assimilation *'devoicing'*. Then, second process will take place, i.e. the manner of articulation assimilation process. It is achieved in two derivational steps. In the third step, the voiceless uvular fricative /χ/ loses its manner of articulation [+cont.] feature specification. Next, the candidate gains the [-cont.] feature specification in the fourth step. At this stage, the ranking of the assimilation processes for uvulars alternation in HA is: Voice assimilation >> manner of articulation assimilation.

V. Results

Unlike what has been reported in the previous research [3]-[11], the alternation of the uvulars /q/ → [ʁ] and /ʁ/ → [q] is categorically "governed" and not in free variation in HA. It occurs due to different assimilation processes. Consonantal environment and sequence as well as vowel adjacency factors are in action in HA. A clear pattern for this alternation is obtained from the collected data. /q/ → [ʁ] alternation is triggered by the adjacency to the front vowels /a/ and /i/ as well as the adjacency to voiced segments such as the approximant /r/. In contrast, the adjacency to the back vowels /ɑ/ and /u/ as well as the emphatic segments /sˤ/, /tˤ/ and /ðˤ/ trigger the alternation of /ʁ/ → [q].

VI. Conclusion

The present study confirms the observations of the previous studies of an occurrence of an alternation phenomenon in the Arabic Gulf dialects between the uvular segments [q] and [ʁ]. However, it contradicts their assumption and findings that there is free variation and a lack of pattern for these alternating segments in the dialects studied [3]-[7]. In HA, a pattern for this alternation phenomenon is found.

The future direction of this study is to investigate, in depth, other uvular segment alternations in HA dialect, i.e. /χ/ and /ɢ/ in order to provide a comprehensive analysis, which will provide better understanding of the behavior of uvulars in HA.

Appendix

TABLE V
List of Constraints

AGREE [VOICE]	The uvular segment in CC sequence must agree to the adjacent segment in feature [voice] at lexical level.
HAVE VOICE	Assign one violation mark for every segment that has no voice specification.
MAX-IO [VOICE]	Assign one violation mark for every px that has no corresponding py in the [Voice] feature.
NOLNK [VOICE]	Assign one violation mark for linking the unspecified [Voice] coda /Ɣ/ with the onset in the [Voice] feature.
AGREE [CONT]	The uvular segment in CC sequence must agree to the adjacent segment in feature [Cont] at lexical level.
HAVE MANNER	Assign one violation mark for every segment that has no manner of articulation specification.
MAX-IO [CONT]	Assign one violation mark for every px that has no corresponding py in the [Cont] feature.
NOLINK [CONT]	Assign one violation mark for linking the unspecified [Cont] coda /Ɣ/ with the onset or coda cluster in the [Cont] feature.

ACKNOWLEDGMENT

King Faisal University, SA and The University of Essex, UK support this research. The author is very grateful to her supervisor Dr. Wyn Johnson for her endless support. The author would like to thank all the participants for their time and devotion.

REFERENCES

[1] Smeaton H. (1973). Lexical Expansion due to Technical Change as Illustrated by the Arabic of Al Hasa, Saudi Arabia. In Kaye A. S. (ed.), International Journal of Middle East Studies. Vol. 8, No. 4, pp. 565-567.

[2] Aljumah, (2008). The syllable shape of Al-Ahsa dialect: an OT perspective. *Poznań Studies in Contemporary Linguistics*, *44*(2), 155-177.

[3] Matar, A. (1969). Specifics of the Kuwaiti Dialect, Kuwait: Risala Publishing.

[4] Bukshaisha, F. (1985). *An experimental phonetic study of some aspects of Qatari Arabic.* Unpublished doctoral dissertation. University of Edinburgh, Edinburgh.

[5] Al-amadidhi, D. (1985). *Lexical and sociolinguistic variation in Qatari Arabic*. Unpublished doctoral dissertation. University of Edinbrugh, Edinbrugh.

[6] Al-Sulaiti. L. (1993). *Some aspects of Qatari Arabic phonology and morphology.* Unpublished doctoral dissertation. University of Essex, Colchester.

[7] Aldaihani, S. (2014). Major Phonological Processes in Kwaity Arabic (KA) An Ootimality Theoretic Study. PhD Thesis, University of Essex.

[8] Hussain, A. A. (1985). *An experimental investigation of some aspects of the sound system of the Gulf Arabic dialect with special reference to duration*. Unpublished doctoral dissertation. University of Essex, Colchester.

[9] Mustafawi, E. M. (2006). *An optimality theoretic approach to variable consonantal alternations in Qatari Arabic* (Doctoral dissertation, University of Ottawa).

[10] Taqi, H. (2010). Two Ethnicities, Three Generations: Phonological Variation and change in Kuwait, PhD thesis, Newcastle University, UK.

[11] Holes, C. (2016) 'Culture, identity and language' in Peterson J.E. (ed.) *The Gulf in History* (in preparation and forthcoming 2016) Al-Tajir Trust, Bloomsbury. c. 20 pp.

[12] McCarthy, J. J. (2016). The theory and practice of Harmonic Serialism. *JJ McCarthy and J. Pater., eds., Harmonic Grammar and Harmonic Serialism. London: Equinox. http://works. bepress. com/john jmccarthy*.

[13] Prince, A. and Smolensky, P. (1993/2004). Optimality theory: constraint interaction in generative grammar. Malden, MA, & Oxford: Blackwell. (Revision of 1993 technical report, Rutgers University Centre for Cognitive Science. Available on Rutgers Optimality Archive, ROA-537) Cambridge University Press.