

Emphasis Spread in Zilfawi Arabic: An Optimality Theoretic Analysis

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Abstract—The current study seeks to provide a phonological analysis of *emphasis spread* on adjacent segments in Zilfawi Arabic (ZA), one of the spoken dialects in Najd province in central Saudi Arabia, within the optimality theory (OT) framework. There is a shortage of studies that addressed this phonological phenomenon in Arabic dialects from the perspective of the OT. This study leads to deepening the knowledge of the phonological system of this dialect. Moreover, it contributes to documenting this phonological phenomenon related to Saudi Arabia's linguistic diversity. The study implemented the OT to account for the interaction and effect of the emphatic sounds on their adjacent segments. The analysis revealed that the primary emphasis spread has a syllable domain in which the emphatic sound lies and occurs bidirectionally where, consequently, the dominant constraints are MAX-RTR and EMPHATIC-σ, even when there is a morpheme.

Index Terms—assimilation, emphasis spread, methodology, optimality theory, Zilfawi Arabic

I. INTRODUCTION

Many languages in the world have special categories of sounds that are distinguished by their phonological systems. The varieties of Arabic and Hebrew languages have a specific category of sounds called *emphatics*. It is a group of consonant sounds produced by the movement of the tongue root to the pharynx wall (Davenport & Hannahs, 2013). These consonants are labialized with the diacritic [ʕ], presenting the sound as pharyngealized (Ladefoged & Johnstone, 2015). In Arabic, they are /tʕ, δʕ, sʕ, dʕ/. This category of sounds is called *Al Itbaq* (Hussein, 2012).

Emphatic consonants are distinguished by their effect on adjacent sounds. This process is called emphasis spread or pharyngeal spread. Emphatics emphasize neighboring consonants and vowels by sharing some of their phonological features. Their plain counterparts are /t, δ, s, d/ (Carr & Montreuil, 2013). Emphasis spread is a common phonological phenomenon in Arabic dialects and differs from one dialect to another (Davis, 1995). To the best of the researchers' knowledge, very little attention has been given to emphasis spread in Saudi dialects. Therefore, the current phonological study aims to add to the Arabic literature in the field by analyzing the emphasis spread in Zilfawi Arabic (ZA) from the perspective of the Optimality Theory (OT), which has not been analyzed before. In doing so, this study addresses the following questions:

1. What is the primary domain of emphasis spread in ZA?
2. What constraints are required to analyze the primary emphasis spread in ZA within the OT framework?

II. LITERATURE REVIEW

A. Emphasis Spread

Multiple scholars have proved that emphatic consonants affect neighboring sounds in various varieties of Arabic. For example, Watson (1999) proved that in Sanaani Arabic, a dialect spoken in Yemen, emphatic consonants affect the neighboring sounds and assimilate them with the retracted tongue root (RTR) feature. Emphasis spreads to the sounds in the words to share the RTR feature. In addition, the emphasis spread in Sanaani Arabic occurs bidirectionally and is blocked by [+high] vowels on the right.

Davis (1995) applied a grounded phonology framework to analyze southern and northern Palestinian Arabic. The results proved the influence of emphatics on adjacent sounds. The grounded phonology accounted for the effect of the emphasis on both directions of the segments. The emphasis spread on the right is blocked by [+ front] sounds, but no segment blocks it on the left.

Jaradat (2020) studied the influence of the spread of emphasis in Fallaahi Jordanian Arabic. The study demonstrated the effect of emphatics on adjacent sounds in both directions by employing the feature geometry approach. Adjacent sounds assimilate the [+back] feature with neighboring vowels and consonants. However, the spread is blocked to the

right when there is a [+high] [-back] sound. This phenomenon occurs across syllables and word boundaries with suffixes when they are adjacent to emphatics, but prefixes remain unaffected.

In addition, Kulikov et al. (2020) acoustically analyzed the emphasis spread on coronal stops when they occur in a word-initial position in Qatari Arabic. Their analysis focused on the emphasis spread of the left and right effects on a word's sounds, coronal stops, and vowels. The results revealed that the emphatics do not affect the voice onset time of initial plain coronal stop /t/ features. However, the emphasis spread affects the short and long vowels, thus causing them to have a longer duration than plain coronal stops. Moreover, emphasis spread influences the plain /t/ in the leftward spread of emphasis.

Alharbi and Alammam (2022) used the underspecification theory to analyze the emphasis spread on adjacent vowels in Qassimi Arabic, a variety spoken in Najd province. The emphatics in Qassimi Arabic are /t^s, ð^s, s^s, r^s/. The results of their analysis revealed that the emphatics' [dorso-pharyngeal] feature spreads to the adjacent vowels; however, this feature cannot spread to adjacent front vowels /i, æ, æ:/ because they have [+back] as a secondary feature. In addition, the front vowels /i:/ and /e:/ are not influenced by emphatics.

Further, Alammam (2017) conducted an acoustic study on the emphasis spread in ZA. He analyzed emphatics and their plain counterparts in initial and final positions followed or preceded by vowels. He analyzed them in non-sense disyllabic words, CVC.CVC. The study proved that emphasis spreads to all vowels in the words, regardless of the type of vowel; however, the main effect of the spread is on the vowel closer to the emphatic sound in the word. Moreover, emphatics that occur in the initial position have a more substantial effect on vowels than those in the final position. Unlike other studies, Alammam's (2017) study indicates that emphasis can spread in both directions without being blocked by any other segment.

Regardless of the analysis method, all previous studies confirm that emphasis spread occurs bidirectionally. The spread's domain is the word's phonology, not the syllable, and is blocked by certain sounds, such as front vowels; the exception is Kulikov et al. (2020), who studied the effect within only one syllable. Moreover, Alammam (2017) proved that other sounds in ZA do not block the spread of emphasis.

B. *Emphasis Spread and Optimality Theory*

The optimality theory (OT) is one of the fundamental theories in the field of phonology. Alan Prince and Paul Smolensky introduced it in 1990 (McCarthy, 2008). This theory refers to an analysis based on constraints ranked according to the analyzed language. It aims to extract the correct pronounced surface form (i.e., output) from the underlying representations (i.e., input). In addition, it uses constraints to generalize the data for various phonological phenomena—such as assimilation, where the emphasis spread falls under its scope (Davenport & Hannahs, 2013).

Some scholars in the field of phonology conducted studies using the OT as a framework for their analyses on emphasis spread. Van De Vijver (1996) used southern and northern Palestinian Arabic data from Davis (1995) to analyze the emphasis spread within the OT framework. The researcher claimed that if there is a blocking of emphasis spread in all Arabic varieties, it will be in the rightward direction of the emphatic sound, not the leftward. He used different constraints for southern and northern Palestinian Arabic. For southern Palestinian Arabic, he applied the following constraints: EMPHATIC-σ, RHi^ONSj[EM] >> [HI, FR, EM]. In contrast, the northern Palestinian Arabic presented a more restricted behavior of emphasis spread. Consequently, he used variant constraints to account for it—EM-NUC, EM-[LAR] >> *ONS[EM]. In general, emphasis spread in both dialects is related to the relationship between syllables and rhyme.

Similarly, McCarthy (1997) conducted a study to prove the applicability of the OT to specify the constraints needed to analyze the data from Davis (1995) in southern and northern Palestinian Arabic. The constraints were IDENT-RTR, RTR-LEFT >> RTR-HI >> RTR-TO-A >> RTR-RIGHT >> RTR/LOWER-VT >> IDENT-ATR. The analysis proved that the bidirectional emphasis spread is blocked with [+front] [+high] vowels and the consonants /ʃ, dʒ, and j/.

In contrast, Al-Raba'a and Davis (2020) studied emphasis spread in a rural Jordanian Arabic subvariety. The domain of emphasis in that dialect is the syllable, not the phonology of words. The researchers revealed that emphasis spreads within a syllable in both directions and is unblocked by any sound. They used the following constraints: MAX-RTR, EMPHATIC-σ >> DEP-LINK-RTR >> RTR-LEFT, RTR-RIGHT.

A study conducted by Abudaljuh et al. (2022) applied the constraints of McCarthy (1997) to their research on rural Jordanian Arabic. The former's analysis demonstrated that emphasis in this variety spreads to the leftward and rightward segments and is blocked by [+front] [+high] sounds, as also revealed in Davis (1995), McCarthy (1997), and Alharbi and Alammam (2022). In addition, emphasis spreads to one morpheme boundary only; consequently, the scholars added two other constraints related to words that include affixes to show the effect of emphasis spread; the added constraints were [RTR-++] and [RTR-+].

In general, the studies that applied OT proved that emphasis spread in Arabic dialects has a syllable domain and, thus, there are no blocking sounds (Al-Raba'a & Davis, 2020). The other domain is the phonology of words, and it is presented in variant Arabic dialects (Van De Vijver, 1996; McCarthy, 1997; Abudaljuh et al., 2022). However, there is a shortage of studies in the literature that use the OT to analyze the emphasis spread in Saudi varieties. Consequently, the current study aims to employ the OT framework to analyze the data and apply the required constraints on ZA.

C. *Linguistic Aspects of Najdi Arabic*

Najdi Arabic (NA) is one of the leading spoken dialects in Saudi Arabia, and it encompasses several varieties. It is spoken in the central area of Saudi Arabia. Multiple phonological phenomena occur in this dialect, such as metathesis and epenthesis (Alqahtani, 2014). Consequently, various linguists used the OT as a framework to analyze the phonological system of this dialect. According to the Arabic literature on the phonology of certain Arabic varieties, syllable structure strongly affects variant phonological phenomena (Alabeeky, 2022; AlAmro, 2015; Al-Momani et al., 2023; Alqahtani, 2020). Ruthan (2024) analyzed the syllable structure of consonant clusters in word-initial position in NA. The researcher analyzed the NA-spoken data from the Riyadh region to identify whether onsets in the dialect are simple or complex. Utilizing OT, the researcher argued that the onsets in NA are simple. His study proved that syllables in the sequences of consonants in word-initial position are #C.CV# not #CCV#.

Besides, Alhoody and Aljutaily (2022) analyzed the weight of superheavy syllables in Qassimi Arabic (i.e., one of the notable varieties of NA). Their study agreed with Ruthan's (2024) on NA that Qassimi Arabic prefers simple onsets. The researchers used Praat Software to measure stressed syllables' pitch, duration, and loudness. They also analyzed data from accounts of the OT and concluded that superheavy syllables are bi-moraic and weigh the same as heavy syllables in this dialect.

Another study by Alrasheedi (2023) analyzed syllables in NA. The researcher argued that prefixes lead to re-syllabification depending on the number of syllables in the core word, thereby leading to a change in the stress place. The analyzed prefixes were the definite article /ʔal-/ , prepositional prefixes (such as *fi-* and *ba-*), verbal prefixation, and adverbial prefixation /ʔib-/. The findings revealed that the syllables are rearranged when prefixes are added to words—consequently, the stress placement changes. However, re-syllabification is blocked when the first syllable of the core word is heavy. The literature on the syllable structure of NA provides an analysis of the syllabification and structure of syllables in NA, which enables an analysis of the data of other Arabic varieties to examine the effect of affixes on the emphasis spread and whether it is related to syllables or the phonology of words.

Zilfawi Arabic (ZA) is another variety of NA. It is spoken by people in Az Zulfi city. It has a distinguished phonetic and phonological system from modern standard Arabic and classical Arabic (Alammar, 2017). Besides, it has a few distinguishing features from other NA varieties. It has 27 consonants and 12 vowels in its phonetic inventory, as depicted in Table 1 (Alammar, 2023).

TABLE 1
THE PHONEMIC INVENTORY OF ZILFAWI ARABIC CONSONANTS (ALAMMAR, 2023, P. 5)

	Bilabial	Labiodental	Interdental	Dental	Alveolar	Alveopalatal	Palatal	velar	Uvular	Pharyngeal	Glottal
Stop	b			t d				k g			ʔ
Emphatic stop				tʔ							
Fricative		f	θ ð		s z	ʃ			χ ʁ	ħ ʕ	h
Emphatic fricative			ðʔ		sʔ						
Affricate						dʒ					
Nasal	m				n						
Liquid				l	r						
Glide	w						j				

Concerning vowels, Alammar (2023) states that ZA has three short vowels: /i/, /a/, and /u/. In addition, there are other vowels based on one of the researchers' knowledge as a native Zilfawi speaker. The additional vowels are /e/, /ə/, /o/, and /ʌ/, as in the following examples:

(1) Short vowels

- a) [ʕam] "uncle"
- b) [bint] "a girl"
- c) [kum] "sleeve"
- d) [ləh] "no"
- e) [tʔʌb] "he jumped"

- f) [reħ] “go”
g) [tsof] “stop”

Moreover, ZA has five long vowels /i:/, /a:/, /u:/, /e:/, and /o:/ (Alammar, 2023), as in the following examples:

- (2) Long vowels
a. [tʰi:b] “perfume”
b. [ra:s] “head”
c. [ru:h] “soul”
d. [tʰe:r] “bird”
e. [lo:n] “color”

Alammar (2017) states that stress falls on three syllables in ZA. They are antepenultimate, penultimate, or final syllables. When two or more heavy syllables are in a word, stress will be on the rightmost heavy one. The penultimate might be stressed if it is the only heavy syllable. The final position attracts stress only if it is CVVC or CVCC. However, the stress falls on the penultimate syllable if all these syllables are light.

III. ANALYSIS OF EMPHASIS SPREAD IN ZILFAWI ARABIC

The emphatics in ZA are /tʰ, ðʰ, sʰ/. This variety of NA has a syllable domain for the primary emphasis spread. Consequently, the RTR feature spreads to all the syllable segments. There is no blocking segment, and thus, it is not related to the phonology of words. The following data in Table 2 explain this phenomenon.

TABLE 2
DATA ON EMPHASIS SPREAD FROM ZA

a. /isʰr.ar/	‘bundle’	j. /fa.rðʰ/	‘obligation’
b. /sʰa.ləh/	‘living room’	k. /sʰa.mit/	‘silent’
c. /ðʰarb/	‘hitting’	l. /sʰal/	‘he got angry’
d. /nʰatʰ/	‘jump’	m. /im.sʰu.fir/	‘yellowed’
e. /fur.sʰah/	‘chance’	n. /ðʰʌb/	‘lizard’
f. /ðʰa.har/	‘back’	o. /ðʰa.bitʰ/	‘police officer’
g. /tʰaw.ləh/	‘table’	p. /iðʰ.læl/	‘shades’
h. /iy.lesʰ/	‘hurry up’	q. /tʰa.min/	‘lowered’
i. /im.fʰatʰ.ətʰ/	‘exited’	r. /ðʰo.ma/	‘thirst’

The bold syllables are the emphasized ones.

The data presented in Table 2 reveal that the primary emphasis spreads clearly to all the segments in the syllable. For example, in /sʰa.ləh/ ‘living room’, the emphasis of /sʰ/ spreads to the vowel of the first syllable, which is similar to the other words in the data. The emphasis spreads to both directions—for example, the word /ðʰa.bitʰ/ ‘police officer’ emphasis spreads to the entire segments because it contains two emphatics in two syllables in the word. The emphatic sound affects the adjacent sounds to acquire the RTR feature.

Depending on the data analysis, the ZA need faithfulness and markedness constraints to account for the spread of emphasis.

Constraints:

(a) MAX-RTR: “Assign a constraint violation to any RTR feature in the input that is not realized in the output” (Al-Raba’a & Davis, 2020, p. 24)

(b) DEP-LINK-RTR: “Assign a constraint violation to any link to an RTR feature in the output that is not realized in the input” (Al-Raba’a & Davis, 2020, p. 24)

(c) EMPHATIC-σ: “A syllable must be emphatic if one of the rhyme segments is emphatic” (Van De Vijver, 1996, p. 248).

(d) RTR-LEFT: “Any instance of RTR is aligned initially in Word” (McCarthy, 1997, p. 235).

(e) RTR-RIGHT: “Any instance of RTR is aligned finally in Word” (McCarthy, 1997, p. 235).

Constraint (a) is a faithfulness constraint that prohibits the deletion of the emphatic feature in the input to be non-emphatic in the output. Similarly, constraint (b) is a faithfulness constraint that prohibits any spread of the RTR feature to other segments in words. In contrast, constraint (c) is a markedness constraint that requires any RTR feature in a syllable to be spread to all segments. Constraint (d) is a markedness constraint that requires the RTR feature to be spread leftward till the beginning of the word. Lastly, constraint (e) is a markedness constraint that requires the RTR feature to spread till the end of the word in the output. ZA needs all the previous constraints to account for the primary emphasis spread.

The constraints are analyzed to specify the appropriate ranking based on the data from ZA that presented the optimal outputs. First, the relationship of the MAX-RTR and EMPHATIC-σ constraints with the DEP-LINK-RTR constraint are analyzed in Tableaux (1) and (2) for the ranking.

(1) /isʰr.ar/ “bundle” (see Table 2a)

Input: /isʰr.ar/	MAX-RTR	DEP-LINK-RTR
≡ a. /isʰr.ar/		**
b. /isʰr.ar/	*!	

The first candidate eliminates the second candidate in (1b) since it suffers a fatal violation due to the higher ranking of the constraint MAX-RTR in ZA. On the other hand, candidate (1a) wins since it respects the ranking of MAX-RTR to be higher than the DEP-LINK-RTR. Consequently, the ranking of these constraints is

MAX-RTR >> DEP-LINK-RTR

If these two constraints are reordered, it will yield a wrong output from the input. Therefore, the optimal output should preserve the RTR feature. Similarly, the EMPHATIC- σ constraint outranked the DEP-LINK-RTR, as shown in Tableau (2).

(2) /is^r.ar/ “bundle” (see Table 2a)

Input: /is ^r .ar/	EMPHATIC- σ	DEP-LINK-RTR
a. /is ^r .ar/	*!	*
\Rightarrow b. /is ^r .ar/		**
c. /is ^r .ar/	*!	

Tableau (2) shows that the emphasis should spread to all the segments in the syllable. Consequently, candidates (2a) and (2c) get a fatal violation. For the first candidate (2a), the emphatic feature spreads to only one segment in the syllable, which is not allowed in ZA. Similarly, the third candidate (2c) is eliminated due to the same violation, and the RTR feature is only limited to the emphatic sound. The optimal candidate (2b) is favored because it respects the order of these two constraints. Consequently, the ranking of the constraints is

MAX-RTR, EMPHATIC- σ >> DEP-LINK-RTR

The constraints MAX-RTR and EMPHATIC- σ ranked higher than the DEP-LINK-RTR. This ranking is demonstrated in Tableau (3).

(3) /is^r.ar/ “bundle” (see Table 2a)

Input: /is ^r .ar/	MAX-RTR	EMPHATIC- σ
\Rightarrow a. /is ^r .ar/		
b. /is ^r .ar/	*!	

Both are ranked the highest in the hierarchy because if we reverse the order, the same result will be yielded, and the optimal output would be (3a). There is no other constraint in ZA that dominates the two.

(4) /im.s^u.fir/ “yellowed” (see Table 2m)

Input: /im.s ^u .fir/	EMPHATIC- σ	RTR-LEFT
\Rightarrow a. /im.s ^u .fir/		**
b. /im.s ^u .fir/	*!	**

The analysis in Tableau (4) presents that the constraint RTR-LEFT is ranked lower than the EMPHATIC- σ since the optimal candidate is (4a), where the emphasis spreads rightward of the emphatic segment. In contrast, candidate (4b) gets a fatal violation since it violates the EMPHATIC- σ constraint. Moreover, it gets two violation marks because the emphasis did not spread to the left side of the word.

(5) /im.s^u.fir/ “yellowed” (see Table 2m)

Input: /im.s ^u .fir/	EMPHATIC- σ	RTR-RIGHT
\Rightarrow a. /im.s ^u .fir/		***
b. /im.s ^u .fir/	*!	***

Candidate (5a) is the optimal output since it follows the requirements of the constraint EMPHATIC- σ . However, it violates the RTR-RIGHT constraint three times. Candidate (5b) gets a fatal violation because it violates the EMPHATIC- σ , which presents the ranking of these two constraints in the hierarchy in ZA.

EMPHATIC- σ >> RTR-LEFT, RTR-RIGHT

(6) /im.s^u.fir/ “yellowed” (see Table 2m)

Input: /im.s ^u .fir/	DEP-LINK-RTR	RTR-LEFT
\Rightarrow a. /im.s ^u .fir/	*	**
b. /im.s ^u .fir/	***!	

Tableau (6) presents that candidate (6a) is the optimal output since it respects the DEP-LINK-RTR constraint. In contrast, the second candidate (6b) gets a fatal violation for the DEP-LINK-RTR constraint since it violates it three times. However, it respects the RTR-LEFT, which will yield a wrong output. Consequently, DEP-LINK-RTR is ranked higher than RTR-LEFT.

(7) /im.s^u.fir/ “yellowed” (see Table 2m)

Input: /im.s ^u .fir/	DEP-LINK-RTR	RTR-RIGHT
^{EF} a. /im.s ^u .fir/	*	***
b. /im.s ^u .fir/	****!	

Tableau (7) shows that the optimal candidate (7a) respects the DEP-LINK-RTR constraint. In contrast, the second candidate (7b) gets a fatal violation because it violates the DEP-LINK-RTR constraint four times but respects the RTR-RIGHT constraint. This analysis proves that the constraint DEP-LINK-RTR is higher than RTR-LEFT and RTR-RIGHT. The ranking of all the constraints in the emphasis spread in ZA emphasis is presented below:

MAX-RTR, EMPHATIC-σ >> DEP-LINK-RTR >> RTR-LEFT, RTR-RIGHT

(8) /is^r.ar/ “bundle” (see Table 2a)

Input: /is ^r .ar/	MAX-RTR	EMPHATIC-σ	DEP-LINK-RTR	RTR-LEFT	RTR-RIGHT
a. /is ^r .ar/		*!	***	*	
^{EF} b. /is ^r .ar/			**		**
c. /is ^r .ar/	*!				
d. /is ^r .ar/		*!		*	***
e. /is ^r .ar/		*!	*		***

In Tableau (8), candidate (8c) gets a fatal violation of the MAX-RTR constraint. Similarly, candidates (8a), (8d), and (8e) are ruled out due to their fatal violation of the high-ranked EMPHATIC-σ constraint. In contrast, the winning candidate (8b) respects all the high-ranked constraints and violates only the low ones—the DEP-LINK-RTR and RTR-RIGHT constraints—twice for each.

(9) /ð^a.bit^ʃ/ “police officer” (see Table 2o)

Input: /ð ^a .bit ^ʃ /	MAX-RTR	EMPHATIC-σ	DEP-LINK-RTR	RTR-LEFT	RTR-RIGHT
a. /ð ^a .bit ^ʃ /	*!		**	**	
b. /ð ^a .bit ^ʃ /		**!		***	***
c. /ð ^a .bit ^ʃ /	**!				
^{EF} d. /ð ^a .bit ^ʃ /			***		
e. /ð ^a .bit ^ʃ /	*!		*		***

The ranking also accounts for the word /ð^a.bit^ʃ/ ‘police officer’ in Tableau (9). Candidates (9a), (9c), and (9e) are immediately excluded because of their fatal violation of the high-ranked constraint MAX-RTR. Moreover, candidate (9b) is ruled out due to its fatal violation of the EMPHATIC-σ constraint. Finally, the optimal output is (9d), which satisfies the high-ranked constraints and only violates the low-ranked DEP-LINK-RTR constraint three times.

(10) /t^a.min/ “lowered” (see Table 2q)

Input: /t ^a .min/	MAX-RTR	EMPHATIC-σ	DEP-LINK-RTR	RTR-LEFT	RTR-RIGHT
a. /t ^a .min/		*!			****
b. /t ^a .min/			****!		
^{EF} c. /t ^a .min/			*		***
d. /t ^a .min/	*!				
e. /t ^a .min/	*!	*	****	*	

Candidates (10d) and (10e) are excluded since they violate the MAX-RTR constraint. Moreover, candidate (10a) is ruled out due to its fatal violation of one of the high-ranked constraints, EMPHATIC-σ. Candidate (10b) is excluded because it violates the DEP-LINK-RTR constraint four times, while the winning candidate (10c) only violates it once.

Morphemes

In ZA, morphemes are not clearly affected by the emphasis spread because they occur in different syllables linked to the root word, as evident in the following examples in Table 3.

TABLE 3
EMPHASIS SPREAD DATA WITH MORPHEMES IN ZA

s. /ri.s ^a .as ^ʃ /	/ri.s ^a .s ^a .ə.-ha/	‘her pencil’
t. /m ^ə lt ^ʃ /	/im.l ^ə t ^ʃ .-ha/	‘smear it’
u. /t ^a .la.b/	/ja.-ə ^t .leb/	‘he orders’
v. /ra.g ^ə s ^ʃ /	/ir.g ^ə s ^ʃ .- əw/	‘they danced’
w. /h ^a .feð ^ʃ /	/h ^a .feð ^ʃ .-ha/	‘he memorized it’
x. /g ^ə s ^ʃ /	/g ^ə s ^ʃ .s ^a -hin/	‘he cut them’
y. /m ^ə ʃ.ət ^ʃ /	/j ^ə .-im.fet ^ʃ /	‘he pulls it’

Based on the above analysis of morphemes in ZA, there is a need for a markedness constraint that can account for the emphasis spread when there is a morpheme in words, either prefixes or suffixes.

RTR-+: “no morphemic boundary in an RTR domain” (Abudaljuh et al., 2022, p. 22).

Tableau (11) analyzes the accurate ranking of constraints when a word has a morpheme.

(11) /ha.feð^ɕ.-ha/ “he memorized it” (see Table 3w)

Input: /ha.feð ^ɕ .-ha/	DEP-LINK-RTR	RTR-+
a. /ha.feð ^ɕ .-ha/	****!	*
^{EF} b. /ha.feð ^ɕ .-ha/	**	

Tableau (11) presents evidence that the constraint RTR- + is ranked lower than the DEP-LINK-RTR constraint since candidate (11a) violates the DEP-LINK-RTR constraint four times. ZA treats morphemes as the other syllables that do not have an emphatic sound; thus, the primary emphatic feature does not spread to it with the same degree. The ranking of all the constraints, when there is a morpheme in ZA, is presented below:

MAX-RTR, EMPHATIC-σ >> DEP-LINK-RTR >> RTR- +, RTR-LEFT, RTR-RIGHT

(12) /ha.feð^ɕ.-ha/ “he memorized it” (see Table 3w)

Input: /ha.feð ^ɕ .-ha/	MAX-RTR	EMPHATIC-σ	DEP-LINK- RTR	RTR-+	RTR - LEFT	RTR-RIGHT
a. /ha.feð ^ɕ .-ha/			*****!	*		
^{EF} b. /ha.feð ^ɕ .-ha/			**		**	**
c. /ha.feð ^ɕ .-ha/	*!					
d. /ha.feð ^ɕ .-ha/			****!	*	**	
e. /ha.feð ^ɕ .-ha/		*!			****	**

Tableau (12) analyzes a word with the suffix [-ha] in ZA. First, candidate (12c) is ruled out due to its violation of the constraint MAX-RTR. In addition, candidate (12e) is excluded since it violates the EMPHATIC-σ constraint. Further, candidates (12a) and (12d) are eliminated due to their violation of the DEP-LINK-RTR constraint, six times for (12a) and four times for (12d). Finally, the optimal output is candidate (12b) since it satisfies all the high-ranked constraints. It violates the DEP-LINK-RTR constraint twice, less than candidates (12a) and (12d).

(13) /ja-.əf.leb/ “he orders” (see Table 3u)

Input: /ja-.əf.leb/	MAX-RTR	EMPHATIC-σ	DEP-LINK- RTR	RTR-+	RTR - LEFT	RTR-RIGHT
a. /ja-.əf.leb/			****!		**	
b. /ja-.əf.leb/			***!	*		***
^{EF} c. /ja-.əf.leb/			*		**	***
d. /ja-.əf.leb/	*!					
e. /ja-.əf.leb/			*****!	*		

Tableau (13) analyzes a word with the prefix [ja-]. First, Candidate (13d) is excluded because it violates the MAX-RTR constraint. Candidates (13a), (13b), and (13e) are excluded due to their fatal violation of the DEP-LINK- RTR constraint, four times for (13a), three times for (13b) and six times for (13e). Lastly, the winning candidate (13c) only violates the low-ranked DEP-LINK-RTR once.

IV. CONCLUSION

This study analyzed emphasis spread in ZA. The results revealed that the primary emphasis spread has a syllable domain. Therefore, all segments in the syllable share the RTR feature. This phonological phenomenon was analyzed using the OT framework. Consequently, the analysis proved that the MAX-RTR and EMPHATIC-σ constraints dominate the other lower constraints. For morphemes, it was demonstrated that ZA deals with morphemes as it does with other syllables, where the primary emphasis spreads to the syllable that includes the emphatic sound. The results of the current study on the main emphasis spread in ZA agree with those of the acoustic study conducted by Alammar (2017). However, this study focuses only on the primary emphatics. Further study is needed to analyze secondary emphatic sounds in the phonology of ZA.

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REFERENCES

- [1] Abudaljuh, M., Jaber, A., & Omari, O. (2022). An optimality theoretic account for pharyngealization spread in Rural Jordanian Arabic. *Italian Journal of Linguistics*, 34(1), 3–30. <https://doi.org/10.26346/1120-2726-182>

- [2] Alabeeky, R. M. (2022). Word stress in Qassimi Arabic: A constraint-based analysis. *International Journal of English Linguistics*, 12(1), 98–119. <https://doi.org/10.5539/ijel.v12n1p98>
- [3] Alammr, A. (2017). *Emphasis in Zilfaawi Arabic* [Doctoral dissertation, Stony Brook University]. DSpace Repository. Retrieved November 3, 2024, from <http://hdl.handle.net/11401/77737>
- [4] Alammr, A. (2023). An acoustic study of Zilfaawi Arabic vowels. *Journal of Arabic Sciences and Humanities | Qassim University*, 2(1), 1–34.
- [5] AlAmro, M. (2015). Syllabification in Najdi Arabic: A constraint based analysis. *Arab World English Journal*, 6(4), 373–388. <https://doi.org/10.2139/ssrn.2847466>
- [6] Alharbi, B., & Alammr, A. (2022). Emphasis spread in Qassimi Arabic within the underspecification theory. *World Journal of English Language*, 12(1), 407–418. <https://doi.org/10.5430/wjel.v12n1p407>
- [7] Alhoody, M. M., & Aljutaily, M. F. (2022). An optimality-theoretic approach to weight of superheavy syllables in Qassimi Arabic. *World Journal of English Language*, 12(5), 1–10. <https://doi.org/10.5430/wjel.v12n5p1>
- [8] Al-Momani, D. F., Al-Qudah, F. Z., & Sayyed, S. (2023). Analysis of stress assignment patterns of Standard Arabic within the optimality theory framework. *Eurasian Journal of Applied Linguistics*, 9(2), 246–275. <http://dx.doi.org/10.32601/ejal.922021>
- [9] Alqahtani, M. S. M. (2020). Initial geminations as non-actual surface forms in Qassimi Arabic. *Acta Linguistica Academica*, 67(3), 347–369. <https://doi.org/10.1556/2062.2020.00018>
- [10] Alqahtani, M. S. M. (2014). *Syllable structure and related processes in optimality theory: An examination of Najdi Arabic* [Doctoral dissertation, Newcastle University]. DSpace Repository. Retrieved September 18, 2024, from <http://theses.ncl.ac.uk/jspui/handle/10443/2757>
- [11] Al-Raba'a, B. I. M., & Davis, S. (2020). The typology of pharyngealization in Arabic dialects focusing on a rural Jordanian variety. *Journal of Universal Language*, 21(2), 1–42. <https://doi.org/10.22425/jul.2020.21.2.1>
- [12] Alrasheedi, E. S. (2023). The effect of prefixation on syllable structure in Najdi Arabic. *Theory and Practice in Language Studies*, 13(10), 2557–2564. <https://doi.org/10.17507/tpls.1310.14>
- [13] Carr, P., & Montreuil, J.-P. (2013). *Phonology* (2nd ed.). Palgrave Macmillan.
- [14] Davenport, M., & Hannahs, S. J. (2013). *Introducing phonetics and phonology* (3rd ed.). Routledge, Taylor & Francis Group.
- [15] Davis, S. (1995). Emphasis spread in Arabic and grounded phonology. *Linguistic Inquiry*, 26(3), 465–498.
- [16] Hussein, I. (2012). The phenomenon of emphatic sounding in Arabic: A phonetic, descriptive and experimental study. *An-Najah University Journal for Research—B (Humanities)*, 26(4), 885–908. <https://doi.org/10.35552/0247-026-004-004>
- [17] Jaradat, M. (2020). Gutturals, emphatics, and the phenomenon of emphasis spread in Fallaahi Jordanian Arabic: A non-linear analysis. *Journal of Language and Linguistic Studies*, 16(4), 1656–1679. <https://doi.org/10.17263/jlls.850979>
- [18] Kulikov, V., Mohsenzadeh, F., & Syam, R. (2020). Effect of emphasis spread on coronal stop articulation in Qatari Arabic. *Proceedings of the Linguistic Society of America*, 5(1), 16–28. <https://doi.org/10.3765/plsa.v5i1.4652>
- [19] Ladefoged, P., & Johnstone, K. (2015). *A course in phonetics* (7th ed.). Cengage Learning.
- [20] McCarthy, J. J. (1997). Process-specific constraints in optimality theory. *Linguistic Inquiry*, 28(2), 231–251.
- [21] McCarthy, J. J. (2008). *Doing optimality theory: Applying theory to data* (1st ed.). Wiley. <https://doi.org/10.1002/9781444301182>
- [22] Ruthan, M. Q. (2024). An optimality-theoretic analysis of syllable structure in Najdi Arabic. *Theory and Practice in Language Studies*, 14(6), 1688–1696. <https://doi.org/10.17507/tpls.1406.09>
- [23] Van De Vijver, R. (1996). Emphasis spread in two dialects of Palestinian. *Linguistics in the Netherlands*, 13, 245–255. <https://doi.org/10.1075/avt.13.23vij>
- [24] Watson, J. C. E. (1999). The directionality of emphasis spread in Arabic. *Linguistic Inquiry*, 30(2), 289–300. <https://doi.org/10.1162/002438999554066>

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