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Syllables and Stress Assignment in Najdi Arabic

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Abstract

The purpose of this paper is to present a detailed and unified analysis of word stress in Najdi Arabic (NA), a variety of Arabic spoken in Najd, located in the central region of Saudi Arabia. Regular stress, seemingly exceptional cases, and also variations within NA itself are all accounted for in a simple and straightforward manner. The proposed analysis is based on two principles. First, unlike previous studies that employ a three-way weight distinction between light, heavy, and superheavy syllables, a binary weight distinction between light (monomoraic) C(C)v; and heavy (bimoraic) C(C)vX(C) is proposed, where "X" is either a vowel or a consonant. Second, word-final consonants are crucially assumed to be "extrasyllabic". The stress algorithm is constrained so that stress may fall on one of the last three syllables of a word, as follows: Stress the rightmost heavy syllable if and only if it is one of the word's last three syllables; otherwise stress the antepenultimate syllable (initial syllable in disyllabic words). Variations within NA and seemingly exceptional cases are accounted for by the fact that stress assignment applies earlier in the derivation before the application of any other phonological processes that subsequently alter the shape of the word.

Keywords

derivation, extrasyllabic, Najdi Arabic, stress, light/heavy syllable, monomoraic, bimoraic, rightmost

1. Introduction

Numerous studies in the Arabic linguistics literature have attempted in recent years to account for word stress assignment in Najdi Arabic (NA), a variety of Arabic spoken in Najd, located in the central region of Saudi Arabia. However, these studies are inadequate as they fail to give a simple and straightforward account that captures the stress generalizations observed in NA. This is due to the fact that most of these studies, if not all, are based on earlier analyses that were primarily aimed to account for stress in other Arabic dialects that display different stress patterns. These earlier analyses were

amended by positing a number of unnecessary and redundant stipulations in order to account for the stress facts in NA. As a result, the stress algorithm proposed by these studies consists of a set of explicitly conditioned sub-rules that are either too broad or too narrow, and in some cases may even incorrectly assign stress to the wrong syllable. Furthermore, these studies make inaccurate claims about NA syllable types and their distribution, which ultimately affect their analysis of stress assignment. Finally, the NA data in these studies contain a number of inaccuracies and inconsistencies.

The purpose of this paper is to present a unified analysis of word stress in NA. In addition to regular stress, the analysis I propose accounts for cases that appear to be exceptional and also for variations within NA itself in a simple and straightforward manner without resorting to redundant or unnecessary stipulations.

This paper is organized as follows. In Section 2 below I review some of the previous studies on NA syllables and stress assignment followed by my proposed analysis in Section 3. In Section 4 I discuss cases which appear to be exceptional and show that they all follow the same general stress algorithm proposed in Section 3. Finally I discuss in Section 5 some variations that exist within NA itself.

2. Previous Studies

2.1 NA Syllables

A number of previous studies have attempted to investigate syllables in NA, which as mentioned above, are based on earlier analyses that were primarily meant to account for other Arabic dialects. Most of these studies, if not all, make a three-way weight distinction between (a) light syllables (CV); (b) heavy syllables (CvC, Cvv); and (c) superheavy syllables (CvCC, CvvC), though they differ in the actual number of syllable types and their distribution within a word.

For example, Alqahtani (2014) divides the ten NA syllable types described by Abboud (1979), Ingham, (1994), and Aleztes (2007) three-ways as in (1) below.

(1) Light: Cv, CCv
Heavy: CvC, CCvC, Cvv, CCvv
Superheavy: CvCC, CCvCC, CvvC, CCvvC

Alqahtani explains that these syllable types occur freely within a word with the following exceptions: (a) CvCC is restricted from occurring word-initially and word-medially; (b) CCvv is restricted from occurring word-medially; and (c) CCv, CCvC and CCvvC are restricted from occurring word-medially and word-finally. These claims, however, are inaccurate as all of these syllables do occur in the aforementioned positions, as will be shown in Table 2 in Section 3 below.

Likewise, Al Motairi (2015) also identifies ten syllable types in Qassimi Arabic (QA), a sub-dialect of NA, and classifies them according to the same three-way distinction in (1) above. In addition, she argues that the so-called “superheavy” syllables may occur word-intially and word-finally. As will be shown in Table 2 below, these syllables may also occur word-medially as they are attested in NA in

general and also in QA in particular.

In another study on QA syllables by Alrashed (2018), the three-way opposition in (1) is also adopted. However, unlike Alqahtani and Al Motairi, Alrashed classifies the syllable CCvC as superheavy instead of heavy (p. 39). While the three-way opposition in (1) might be understood to be motivated on the grounds that "superheavy" syllables contain three segments in the syllable rime as opposed to just two for heavy syllables (and just one segment for light syllables), it is not clear why Alrashed considers CCvC to be "superheavy" as it clearly contains just two segments in the syllable rime.

Furthermore, Alrashed adds two more syllable types to the syllable inventory in (1) above, namely the onsetless syllables vC and vCC, though he does not specify how these two additional syllables fit within the triple classification of syllables that he adopts. The existence of onsetless syllables in QA, as claimed by Alrashed, stands in sharp contrast to the well-established and inviolable constraint that syllables in Arabic must have an onset (Ryding, 2005). To support the claim that onsetless syllables exist in QA, Alrashed provides two spectrograms of the word /ʔal**.**beet/ "the house". In the first spectrogram, the word is pronounced in isolation, whereas in the second spectrogram the word is preceded by /lii/, i.e., /lii**.**al**.**beet/ "the house is mine" (p. 40). Alrashed's analysis of the first spectrogram is inconclusive as he acknowledges that it might be interpreted as either having or lacking a glottal stop /ʔ/ word-initially. However, Alrashed argues that the second spectrogram provides conclusive evidence that confirms the existence of onsetless syllables in Arabic because it shows that the glottal stop /ʔ/ does not occur between the syllables /lii/ and /al/.

Alrashed's uncertainty with respect to the first spectrogram is justified because from a physiological standpoint and across languages, a glottal stop /ʔ/ occurs before vowel-initial words at the absolute beginning of an utterance or after a period of silence, but not in connected speech. This gives support to the first interpretation, i.e., there is in fact a glottal stop /ʔ/ word-initially in the first spectrogram. As for the second spectogram, while Alrashed's observation that there is no glottal stop /ʔ/ separating the two syllables in the second spectrogram is valid, it does not necessarily mean that onsetless syllables exist in Arabic. As a matter of fact, in Alrashed's second spectrogram, the first syllable is incorrectly transcribed as */lii/ with a long vowel instead of the actual transcription /liy/, where the coda is filled with the glide /y/, which is closely related to the vowel /i/ (Spencer, 1996), hence the term "semivowel". As a result, when /liy/ and /ʔal**.**beet/ are pronounced in connected speech, the glottal stop /ʔ/, which occurs at the absolute beginning of an utterance, is dropped and the coda consonant /y/ of the first syllable resyllabifies as the onset of the second syllable, i.e., /li**.**yal**.**beet/, thereby satisfying the requirement that every syllable in Arabic must have an onset.

Finally, AlAmro (2015) also adopts the same three-way syllable opposition above, however, he classifies CCv as a heavy syllable instead of a light syllable. Moreover, AlAmro argues that the "superheavy" syllables CvvC and CvCC may occur only word-finally, which, as will be shown in Table 2 below, may also occur word-initially and word medially. Furthermore, AlAmro claims that NA words have a maximum of four syllables, which is inaccurate as NA words may have up to seven syllables,

e.g., /fi.mis.too.da.ʕaa.tu.hum/ “in their (MASC.) storage rooms”.

The three-way opposition between light (Cv), heavy, (CvC, Cvv), and superheavy (CvCC, CvvC) syllables adopted by these studies essentially means that there is also a three-way opposition between monomoraic (Cv), bimoraic, (CvC, Cvv), and trimoraic (CvCC, CvvC) syllables (Broselow, 1976). However, according to Hayes (1995) and Broselow, Chen, & Huffman (1997), in addition to being a very controversial issue among linguists, three-way oppositions are typologically very rare as languages generally tend to avoid trimoraic syllables by employing various processes such as epenthesis, vowel shortening, etc., in order to conform to the general Bimoraicity Constraint (Broselow, 1992; Watson, 2007).

It must be noted that although Al Motairi (2015) divides NA syllables three-ways, she argues that superheavy syllables are bimoraic in both final and non-final positions. Thus, according to her analysis, superheavy syllables are no different than heavy syllables. If this is the case, then what is the rationale that motivates classifying such syllables as superheavy?

2.2 NA Stress

Previous analyses of NA stress assignment rely on the three-way opposition of syllables discussed above. Consequently, the NA stress algorithm proposed by these analyses consists of multiple sub-rules (minimally four sub-rules and in some cases up to six sub-rules) where the conditions for each rule is explicitly stipulated. That is, each sub-rule is specifically formulated to account for a subset of NA stress patterns and exclude others that do not meet the conditions specified in the sub-rule. The stress rules proposed by these studies differ slightly in the number of sub-rules and also in the ordering of these sub-rules. Overall, the stress rules proposed by these studies can be summarized in (2) below.

(2) *Stress algorithm in previous studies (Alqahtani, 2014; Al Amro, 2015; Alhammad, 2019; Alabeeky, 2022)*

a. Stress the ultimate if it is superheavy (CvvC, CvCC).
b. Stress the penultimate if it is heavy (Cvv, CvC) provided the ultimate is not superheavy.
c. Stress the antepenultimate if it is heavy provided the penultimate is not heavy and the ultimate is not superheavy.
d. Stress the penultimate in disyllabic words provided the ultimate is not superheavy.
e. If a geminate occurs word-finally, then stress the preceding syllable.
f. Do not stress a pre-antepenultimate syllable.

While the stress algorithm in (2) may account for NA stress, it does so by postulating redundant and unnecessary sub-rules that fail to capture the overall generalization of NA stress. An even more serious flaw with the above stress algorithm is that it may incorrectly assign stress to the wrong syllable. For example, according to sub-rule (2e), stress is incorrectly placed on the penultimate syllable in the word */ʔis.**tá**.qarr/ “(he) settled down” instead of the antepenultimate, i.e., /**ʔís**.ta.qarr/.

Furthermore, some of these studies contain a number of inaccuracies and inconsistencies in their data. For example, Alhammad (2019) writes the following about her stress sub-rule number 3 given in (3) below:

(3) *Alhammad's stress sub-rule 3 (Alhammad, 2019, p. 121)*

If there is only one heavy syllable (LH), then it must receive stress no matter where it appears:

a. xa(tám) "he finished"

b. ga(lám) "pen"

c. ṣa(dír) "chest"

There are multiple flaws with this sub-rule. First, Alhammad considers the word-final syllable CvC in the examples above to be heavy which contradicts her earlier statement that "(w)ord-final syllable CvC syllable structure is considered light as the final consonant is ignored." (Alhammad, 2019, p. 119). Second, stress in these examples actually falls on the initial syllable, not the final syllable. Third, the sub-rule in (3) incorrectly predicts stress to fall on the initial (pre-antepenultimate) syllable in */**ʔáʃ.**ʃa**.**ba**.**ka/ "the net" instead of the antepenultimate /ʔaʃ**.ʃá.**ba**.**ka/. Note also the incorrect use of the notation (LH), which refers to the iambic foot and not the syllable. The other studies also contain similar inaccuracies.

3. Syllables and Stress Assignment in NA: Revisited

In this section I propose a very simple and straightforward analysis of word stress assignment in NA. But first syllable types and their distribution are reexamined.

3.1 NA Syllables

Unlike previous studies that divide syllables into three groups (i.e., light, heavy, and superheavy), syllables in NA can be divided into just two groups: light (monomoraic) C(C)v; and heavy (bimoraic) C(C)vX(C), where "X" stands for either a vowel or a consonant. Table 1 below shows the various syllables types subsumed by these two basic syllable structures.

Table 1. Syllable Types in NA

Light (monomoraic) C(C)v			Heavy (bimoraic) C(C)vX(C)		
Cv	(da)ra	"(he) knew"	Cvv	(kaa)tib	"writer"
CCv	(kta)bat	"(she) wrote"	CCvv	(ktaa)bah	"writing"
			CvC	(mak)tab	"office"
			CCvC	(ktib)tah	"(she) wrote"
			CvvC	(baab)	"door"
			CCvvC	(ktaab)	"book"
			CvCC	(bint)	"girl"
			CCvCC	(mriḍt)	"(I/you) got sick"

Table 2 below shows the distribution of these syllable types within a word in NA. As can be seen, with the exception of Cvv and CCvv, which do not occur word-finally, and CCvCC, which occurs only in isolation, there are no restrictions on the occurrence of NA syllable types within a word. That is, they may occur word-initially, word-medially, and word-finally. It must be noted that the long vowel in Cvv is shortened word-finally. However, the long vowel resurfaces upon suffixation. For instance,

(4) /ɣada/ "lunch"
/ɣad**a** + -na/ → /ɣad**aa**-na/ "our lunch"

Table 2. The Distribution of NA Syllable Types within a Word

Syllable Type	Word-Initially	Word-Medially	Word-Finally
Cv	**(da)**ra	mak**(ta)**bah	da**(ra)**
	"(he) knew"	"library"	"(he) knew"
CCv	**(ksa)**rat	ʔal**(bdu)**wi	ʔal**(kla)**
	"(she) broke"	"the Bedouin"	"the kidneys"
Cvv	**(kaa)**tib	ma**(kaa)**tib	_____
	"writer"	"libraries"	
CCvv	**(ktaa)**bah	ʔal**(ktaa)**bah	_____
	"writing"	"the writing"	
CvC	**(mak)**ta**.**bah	ʔis**(tax)**dam	mak**.**ta**(bah)**
	"library"	"(he) used"	"library"
CCvC	**(ktib)**tah	ʔal**(mxa ð)**rif	ʔal**(ʕlab)**
	"(she) wrote it"	"the senile"	"the cans"
CvvC	**(saaʕ)**dah	ʔal**(ħaaḍ)**riin	ʔal**.**ħaaḍ**(riin)**
	"help him!"	"the attendees (MASC.)	"the attendees (MASC.)
CCvvC	**(ktaab)**na	ʔal**(msaaʕ)**daat	ʔal**(ktaab)**
	"our book"	"the assistance (PL.)"	"the book"
CvCC	**(biʕt)**lik	ki**(tabt)**li	ʔis**.**tax**.(damt)**
	"(I) sold for you"	"(you) wrote for me"	"(I/you) used"
CCvCC	Occurs only in isolation, e.g., mriḍt "(I/you) got sick"		

The binary division of syllables as either light or heavy essentially means that syllables are minimally monomoraic and maximally bimoraic, thereby conforming to the Bimoraicity Constraint proposed by Broselow (1992) and also conforming to the common universal tendency to avoid trimoraic syllables (Broselow, Chen, & Huffman, 1997; Hayes, 1995). As such, all the heavy syllables in Table 1 above are equally bimoraic. That is, no distinction is made between CvX syllables, on the one hand, and CvXC syllables, on the other hand, despite the presence of an additional final segment in CvXC. Thus, the question remains as how this additional final segment is viewed. This question has been investigated by

many linguists and a number of proposals have been made to analyze the syllable CvXC as bimoraic instead of trimoraic. These are briefly reviewed below.

According to Hayes (1995), when the syllable CvXC occurs word-finally, the final segment is subject to extrasyllabicity, thereby rendering the syllable as CvX instead of CvXC for stress purposes. The final segment is then integrated into the syllable after the assignment of stress. Figure 1a below shows the structure of the word *bint* "girl", where the final weightless consonant rejoins the syllable after stress. McCarthy (1979) proposes syllable recursion where a syllable may dominate another syllable which is associated with the final segment in the syllable CvXC. According to this analysis, the word *bint* "girl", for example, would have the structure given in Figure 1b below, where the final consonant forms its own syllable and is dominated by another syllable. Likewise, Aoun (1979), Angoujard (1990), and Selkirk (1981) also propose that the final segment forms the onset of a "mora-less" syllable, i.e., a syllable lacking a nucleus (also known as a degenerate syllable). Unlike McCarthy, however, this syllable is dominated by the phonological word rather than by another syllable, as shown in Figure 1c. Kenstowicz (1986) and Kiparsky (2003) propose the structure given in Figure 1d where the final segment along with its mora both link directly to the phonological word bypassing the syllable. Broselow et al. (1992; 1995; 1997) and Watson (2002; 2007) suggest that the final two segments in the syllable CvXC "share" a mora instead of each segment projecting their own mora, as shown in Figure 1e below. Finally, Lindsay-Smith (2021) proposes that the final segment forms a syllable containing a "catalectic" mora, which then integrates into the phonological word, as shown in Figure 1f below.

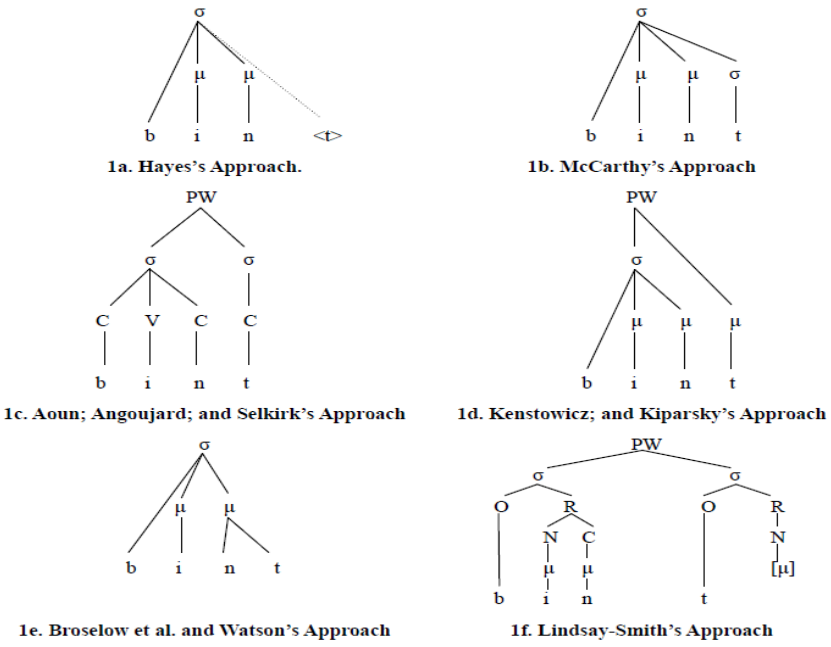

Figure 1. The Different Approaches to CvXC Syllables

Key: σ = Syllable, μ = Mora, PW = Phonological Word,

O = Onset, R = Rime, N = Nucleus, [μ] = Catalectic Mora

It is beyond the scope of this paper to discuss the advantages and disadvantages of these different approaches. However, the point that is pertinent to the current paper is the fact that linguists try to avoid classifying CvXC syllables as superheavy syllables since it implies that they are trimoraic, which, as mentioned earlier, is not only rare cross-linguistically but also controversial as they violate the Bimoraicity Constraint (Broselow, 1992).

3.2 NA Stress

In this section I propose a unified account of word stress in NA and argue that all the stress patterns observed in NA can be captured by a very simple and straightforward stress algorithm. The analysis I propose is based on two principles. First, as discussed above, syllables are either light (monomoraic) or heavy (bimoraic). Second, word-final consonants are crucially assumed to be "extrasyllabic". That is, word-final consonants do not contribute to syllable weight and act as if they were invisible to syllabification and the stress assignment rules, a phenomenon that is not uncommon cross-linguistically as long as the segment in question occurs at a designated edge (i.e., left or right) of the domain (Hayes, 1995). This essentially means that in order for a syllable to count as heavy in word-final position, it must contain more segments than in word-internal position. Accordingly, the heavy syllable C(C)vC is considered light word-finally due to the extrasyllabicity of the final consonant. In contrast the heavy syllables C(C)vv(C) CvCC remain heavy word-finally in spite of the extrasyllabicity of the final consonant because C(C)vv(C) contains a long vowel, whereas CvCC contains a pre-final consonant, which escapes extrasyllabicity. The extrasyllabicity of a word-final consonant is invoked by the rule in (5a) (Kenstowicz, 1994), which basically renders a final consonant extrasyllabic (i.e., invisible) before syllabification and stress assignment take place.

As with other Arabic dialects, stress in NA is quantity sensitive where heavy syllables usually attract stress. Generally speaking, the assignment of stress in NA is highly predictable as it may fall on one of the last three syllables of a word: the ultimate; the penultimate, or the antepenultimate syllable. Stress may never fall on a pre-antepenultimate syllable. Monosyllabic (bimoraic) words are always stressed. As for polysyllabic words, the exact placement of stress depends on the position of the heavy syllable(s) it contains, if any. All the stress patterns in NA are captured by the simple stress algorithm given in (5b) below. Throughout this paper, extrasyllabicity is indicated by angled brackets < >, whereas a stressed syllable is indicated by placing the diacritic mark **[´]** above the nucleus of the syllable, i.e., the vowel. For syllabification purposes, each syllable in a word is placed between parentheses and separated from the other syllables by a dot **[.]**.

(5) a. *Word-Final Consonant Extrasyllabicity (WFCE)*

[+cons] → [+extrasyllabic] / ____ #

b. *Word Stress Assignment (WSA) in NA*

Stress the rightmost heavy syllable if and only if it is one of the word's last three syllables; otherwise stress the antepenultimate syllable (initial syllable in disyllabic words).

According to the algorithm in (5b) above, the stress rule scans the entire phonological word, which consists of the stem and all affixes attached to it (Alsuhaibani, 2022) and targets the heavy syllable that is closest to the right edge of the domain. The actual structure of the syllable is irrelevant. Thus, the two factors that are relevant are (a) the weight of the syllable (i.e., monomoraic vs. bimoraic); and (b) its proximity to the domain's right edge. The only constraint imposed on NA stress is that it is restricted to the last three syllables of the word. As a result, pre-antepenultimate stress is strictly ruled out. Furthermore, if the word contains just one heavy syllable and it is within the range specified by the algorithm (i.e., it is one of the last three syllables of the word), then that heavy syllable is stressed regardless of its position because it will always be the rightmost heavy syllable. In the absence of any heavy syllables, the antepenultimate (penultimate in disyllabic words) is stressed.

Now, let us examine how the stress algorithm in (5b) in combination with the extrasyllabicity rule in (5a) account for stress in NA. The data sets in (6) – (34) show words consisting of different number of syllables starting with monosyllabic words up to hexasyllabic words. In addition, the number and position of heavy syllables varies in each data set. In these examples, (H) stands for heavy syllable, whereas (L) stands for light syllable.

(6) *Monosyllabic Words*

/**bín**<t>/	"girl"
/**báa**<b>/	"door"
/**ktáa**<b>/	"book"
/**mríḍ**<t>/	"(I/you) got sick."

(7) *Disyllabic Words (H + **H** = ultimate stress)*

/(kat)**.(táb)**<t>/	"(I/you) wrote repeatedly"
/(ħaaḍ)**.(ríi)**<n>/	"attendees"
/(ʔal)**.(ktáa)**<b>/	"the book"
/(tʕaal)**.(ʤíi)**<n>/	"(you FEM.) cure"

(8) *Disyllabic Words (L + **H** = ultimate stress)*

/(ki)**.(táb)**<t>/	"(I/you) wrote"
/(ʤa)**.(náa)**<ħ>/	"wing"
/(ra)**.(mée)**<t>/	"(I/you) threw"
/(ḍa)**.(ráb)**<k>/	"(he) beat you (SG., MASC.)"

(9) *Disyllabic Words (**H** + L = penultimate stress)*

/(**k áa).**(ti)<b>/	"writer"
/(**m ák).**(ta)<b>/	"office"

/**(qáa).**(ðị)/ “judge”

/**(sáaʕ).**(da)<h>/ “help him!”

(10) *Disyllabic Words (**L** + L = penultimate stress)*

/(**dá).**(ra)/ “(he) knew”

/(**ktá).**(ba)<t>/ “(she) wrote”

/**(ɣá).**(da)/ “lunch”

/(**rú).**(ma)<t>/ “(she) threw”

(11) *Trisyllabic Words (H + H + **H** = ultimate stress)*

/(ʔis)**.**(tax)**.(dám)**<t>/ “(I/you) used”

/(ʔis)**.**(tix)**.(dáa)**<m>/ “usage”

/(taʕ)**.**(lii)**.(máa)**<t>/ “instructions”

/(ʔal)**.**(ħmaa)**.(ráa)**<t>/ “the donkeys (FEM.)”

(12) *Trisyllabic Words (H + L + **H** = ultimate stress)*

/(mak)**.**(ta)**.(báa)**<t>/ “libraries”

/(ʔin)**.**(fi)**.(ʤáa)**<r>/ “explosion”

/(saa)**.**(ʕa)**.(tée)**<n>/ “two hours”

/(mbaa)**.**(ra)**.(yáa)**<t>/ “matches”

(13) *Trisyllabic Words (L + H + **H** = ultimate stress)*

/(ʃa)**.**(yaa)**.(ţíi)**<n>/ “demons”

/(qa)**.**(waa)**.(míi)**<s>/ “dictionaries”

/(ma)**.**(ħal)**.(láa)**<t>/ “shops”

/(ţa)**.**(bii)**.(báa)**<t>/ “physicians (FEM.)”

(14) *Trisyllabic Words (L + L + **H** = ultimate stress)*

/(ʃa)**.**(ba)**.(káa)**<t>/ “nets”

/(ţa)**.**(la)**.(báa)**<t>/ “orders”

/(wa)**.**(la)**.(dée)**<n>/ “two boys”

/(da)**.**(ra)**.(ʤáa)**<t>/ “grades”

(15) *Trisyllabic Words (H + **H** + L = penultimate stress)*

/(ʃaa)**.(fát).**(hu)<m>/ “(she) saw them”

/(ʔin)**.(táð).**(ra)<t>/ “(she) waited”

/(ʔal)**.(mʕáz).**(zi)<b>/ “the host”

/(kal)**.(lám).**(ha)/ “(he) spoke to her”

(16) *Trisyllabic Words (L + **H** + L = penultimate stress)*

/(ki)**.(táb).**(na)/	“(we) wrote”
/(ǰra)**.(bát).**(ni)/	“(she) beat me”
/(ɣa)**.(dáa).**(na)/	“our lunch”
/(ku)**.(túb).**(hu)<m>/	“(their MASC.) books”

(17) *Trisyllabic Words (**H** + L + L = antepenultimate stress)*

/(**mák).**(ta)**.**(ba)<h>/	“library”
/**(sáa).**(ʕa)**.**(da)<t>/	‘(she) helped”
/**(ʔín).**(fa)**.**(ʤa)<r>/	“(it) exploded”
/**(yák).**(ti)**.**(bi)<n>/	“(they FEM.) write”

(18) *Trisyllabic Words (**L** + L + L = antepenultimate stress)*

/**(ʃá).**(ba)**.**(ka)<h>/	“net”
/**(ʃá).**(ri)**.**(ka)<h>/	“company”
/**(ʔú).**(ma)**.**(ra)/	“princes”
/(**má).**(li)**.**(ka)<h>/	“queen”

(19) *Quadrisyllabic Words (H + H + H + **H** = ultimate stress)*

/(ʔis)**.**(tix)**.**(daa)**.(máa)**<t>	“usages”
/(ʔat)**.**(taʕ)**.**(lii)**.(máa)**<t>/	“the instructions”
/(ʔal)**.**(ʔis)**.**(tix)**.(dáa)**<m>/	“the usage”
/(ʔal)**.**(ħal)**.**(laa)**.(gíi)**<n>/	“the barbers”

(20) *Quadrisyllabic Words (H + H + L + **H** = ultimate stress)*

/(mus)**.**(tan)**.**(qa)**.(ʕáa)**<t>/	“swamps”
/(mis)**.**(taʃ)**.**(fa)**.(yáa)**<t>/	“hospitals”
/(mis)**.**(too)**.**(da)**.(ʕée)**<n>/	“two storage rooms”
/(mis)**.**(taʕ)**.**(ma)**.(láa)**<t>/	“used (PL.)”

(21) *Quadrisyllabic Words (H + L + H + **H** = ultimate stress)*

/(ʔin)**.**(fi)**.**(ʤaa)**.(ráa)**<t>/	“explosions”
/(ʔal)**.**(ma)**.**(ħal)**.(láa)**<t>/	“the shops”
/(ʔaṣ)**.**(ṣa)**.**(naa)**.(díi)**<g>/	“the boxes”
/(ʔal)**.**(ɣa)**.**(raa)**.(níi)**<g>/	“the cranes”

(22) *Quadrisyllabic Words (H + L + L + **H** = ultimate stress)*

/(ʔal)**.**(ma)**.**(li)**.(káa)**<t>/	“explosions”
/(ʔaʃ)**.**(ʃa)**.**(ba)**.(káa)**<t>/	“the nets”
/(ʔaṭ)**.**(ṭa)**.**(la)**.(báa)**<t>/	“the orders”
/(ʔal)**.**(wa)**.**(la)**.(dée)**<n>/	“the two boys”

(23) *Quadrisyllabic Words (H + H + **H** + L = penultimate stress)*

/(ɣad)**.**(dee)**.(náa).**(hu)<m>/	“(we) gave them (MASC.) lunch”
/(ʕal)**.**(lam)**.(tíi).**(hu)<m>/	“(you SG., FEM.) told them (MASC.)”
/(ʔal)**.**(mis)**.(tóo).**(da)<ʕ>/	“the storage room”
/(ʔis)**.**(tax)**.(dám).**(ta)<h>/	“(I/you) used it”

(24) *Quadrisyllabic Words (L + H + **H** + L = penultimate stress)*

/(ma)**.**(kaa)**.(tíb).**(ku)<m>/	“your (MASC.) offices”
/(ðˌa)**.**(rab)**.(náa).**(hu)<m>/	“(we) beat them (MASC.)”
/(ta)**.**(ʕaa)**.(wán).**(ti)/	“(you SG., FEM.) cooperated”
/(ma)**.**(daa)**.(rís).**(na)/	“our schools”

(25) *Quadrisyllabic Words (L + L + **H** + L = penultimate stress)*

/(ʃa)**.**(ba)**.(kát).**(na)/	“our net”
/(ʃa)**.**(ri)**.(káa).**(ti)/	“my companies”
/(ʔa)**.**(ma)**.(rát).**(hi)<n>/	“(she) ordered them (FEM.)”
/(ma)**.**(li)**.(kát).**(hu)<m>/	“their queen”

(26) *Quadrisyllabic Words (H + L + **H** + L = penultimate stress)*

/(ʕal)**.**(la)**.(mát).**(na)/	“(she) told us”
/(dar)**.**(ra)**.(sóo).**(ku)<m>/	“(they) taught you (PL., MASC.)”
/(ʔal)**.**(ma)**.(káa).**(ti)<b>/	“the offices”
/(tak)**.**(ti)**.(búu).**(na)<h>/	“(you SG.) write it”

(27) *Quadrisyllabic Words (H + **H** + L + L = antepenultimate stress)*

/(ʔal)**.(ʔás).**(li)**.**(ħa)<h>/	“the weapons”
/(ʔal)**.(ʔáʕ).**(mi)**.**(da)<h>/	“the pillars”
/(ʔis)**.(táx).**(da)**.**(ma)<t>/	“(she) used”
/(tis)**.(táx).**(di)**.**(ma)<h>/	“(she) uses it”

(28) *Quadrisyllabic Words (L + **H** + L + L = antepenultimate stress)*

/(ta)**.(bás).**(sa)**.**(ma)<t>/ “(she) smiled”

/(ta)**.(ʕáa).**(wa)**.**(na)<t>/ “(she) cooperated”

/(ta)**.(ʕál).**(la)**.**(ma)<w>/ “(they) learned”

/(ta)**.(ǰáa).**(ra)**.**(ba)<w>/ “(they) fought”

(29) *Quadrisyllabic Words (H + **L** + L + L = antepenultimate stress)*

/(ʔaʃ)**.(ʃá).**(ba)**.**(ka)<h>/ “the net”

/(ʔaʃ)**.(ʃá).**(ri)**.**(ka)<h>/ “the company”

/(ʔal)**.(ʔú).**(ma)**.**(ra)/ “the princes”

/(ʔal)**.(má).**(li)**.**(ka)<h>/ “the queen”

(30) *Pentasyllabic (5-syllable) Words (H + H + H + H + **H** = ultimate stress)*

/(ʔal)**.**(ʔis)**.**(tix)**.**(daa)**.(máa)**<t>/ “the usages”

/(ʔal)**.**(ʔis)**.**(tiʕ)**.**(daa)**.(dáa)**<t>/ “the readiness (PL.)”

(31) *Pentasyllabic (5-syllable) Words (H + H + H + L + **H** = ultimate stress)*

/(ʔal)**.**(mis)**.**(too)**.**(da)**.(ʕée)**<n>/ “the two storage rooms”

/(ʔal)**.**(mis)**.**(taʃ)**.**(fa)**.(yáa)**<t>/ “the hospitals”

(32) *Pentasyllabic (5-syllable) Words (H + H + L + **H** + L = penultimate stress)*

/(mis)**.**(too)**.**(da)**.(ʕáa).**(ti)/ “my storage rooms”

/(mis)**.**(taʃ)**.**(fa)**.(yáa).**(ti)<k>/ “your (MASC.) hospitals”

(33) *Pentasyllabic (5-syllable) Words (L + L + **H** + L + L = antepenultimate stress)*

/(ʃa)**.**(ri)**.(káa).**(tu)**.**(hu)<m>/ “their companies”

/(ma)**.**(li)**.(káa).**(tu)**.**(ku)<m>/ “your queens”

(34) *Hexasyllabic (6-syllable) Words (H + H + L + **H** + L + L = antepenultimate stress)*

/(mis)**.**(too)**.**(da)**.(ʕáa).**(tu)**.**(hu)<m>/ “their storage rooms”

/(mis)**.**(taʃ)**.**(fa)**.(yáa).**(tu)**.**(ku)<m>/ “your hospitals”

As can be clearly seen from the data in (6) – (34), the rightmost heavy (bimoraic) syllable is consistently stressed if it occurs within the range of the stress algorithm (i.e., the last three syllables of a word) regardless of its internal structure. In all the other cases where none of the last three syllables are heavy, the antepenultimate syllable is consistently stressed (penultimate in disyllabic words).

In the following section I discuss some cases that appear to violate the stress algorithm in (5b) and show that these seemingly exceptional cases in fact follow the same stress algorithm, however, they are subject to certain phonological processes that subsequently alter the shape of the word after the assignment of stress.

4. Exceptional Stress

4.1 CvCvC-Shaped Nouns

Consider the examples in (35) below where the definite article prefix /ʔal-/ "the" attaches to a CvCvC-shaped noun stem. As can be seen, the words in (35a) conform to the stress rule as the antepenultimate syllable is stressed, whereas the words in (35b) appear to violate the stress rule since the penultimate syllable is stressed instead of the antepenultimate.

(35) a. *Regular stress*

/**ʔál.**wa**.**lad/	"the boy"
/**ʔál.**ʤi**.**bal/	"the mountain"
/**ʔál.**ga**.**lam/	"the pen"

b. *Irregular stress*

/ʔal**.ħá.**bil/	"the rope"
/ʔal**.ʤí.**sim/	"the body"
/ʔaṭ**.ṭú.**fil/	"the child"

This seemingly exceptional stress placement for the words in (35b) is accounted for by the fact that the final vowel in these words is actually epenthetic. That is, the stems in (35b) are underlyingly monosyllabic, whereas the stems in (35a) are underlyingly disyllabic. The underlying forms of the stems in (35b) contain a final consonant cluster that does not conform to the phonotactics of NA because the consonant cluster rises in sonority instead of falling, which violates the Sonority Sequencing Principle (SSP) (Roca, 1994). This violation is repaired by epenthesizing a vowel to break up the final consonant cluster according to the well-formedness rule in (36) below.

(36) *Well-Formedness Rule: Word-Final Coda Vowel Epenthesis (CVE)*

$\emptyset \rightarrow$ [+syll] / C_1 ____ C_2 # (where C_1 is more sonorous than C_2)

Two pieces of evidence support this argument. First, adding a suffix (e.g., the dual suffix /-een/) to the words in (35) results in the deletion of the final vowel in (35b), but not in (35a). Note also that stress shifts to the final syllable (i.e., the suffix), as dictated by the stress rule.

(37) a. *No vowel deletion*

/**ʔál.**wa**.**la̲d + -een/	→	[ʔal**.**wa**.**la̲**.déen**]	"the two boys"
/**ʔál.**ʤi**.**ba̲l + -een/	→	[ʔal**.**ʤi**.**ba̲**.léen**]	"the two mountains"
/**ʔál.**ga**.**la̲m + -een/	→	[ʔal**.**ga**.**la̲**.méen**]	"the two pens"

b. *Vowel deletion*

/ʔal**.ħá.**bi̲l + -een/	→	[ʔal**.**ħab**.léen**]	“the two ropes”
/ʔal**.ʤí.**si̲m + -een/	→	[ʔal**.**ʤis**.méen**]	“the two bodies”
/ʔaṭ**.ṭú.**fi̲l + -een/	→	[ʔaṭ**.**ṭuf**.léen**]	“the two children”

Second, the stems in (35b) are actually monosyllabic in Classical Arabic, which is the mother language of NA (and, for that matter, all the Arabic dialects spoken today).

(38) /ħábl/ “rope”
/ʤísm/ “body”
/ṭúfl/ “child”

So in light of this analysis, the stress algorithm is in fact observed by the data in both (35a) and (35b), as shown by the derivations of /**ʔál.**wa**.**lad/ “the boy” and /ʔal**.ħá.**bil/ “the rope” in Table 3 below.

Table 3. Derivation of the words /ʔál.wa.lad/ “the boy” and /ʔal.ħá.bil/ “the rope”

UR	/ʔalwalad/	/ʔalħabl/
WFCE	/ʔalwala<d>/	/ʔalħab<l>/
Syllabification	/(ʔal)**.**(wa)**.**(la)<d>/	/(ʔal)**.**(ħab)<l>/
WSA	/**(ʔál).**(wa)**.**(la)<d>/	/(ʔal)**.(ħáb)**<l>/
WFCE Revocation	/**ʔál.**wa**.**lad/	/ʔal**.ħábl**/
CVE	—— N/A ——	/ʔal**.ħáb**il/
Resyllabification	—— N/A ——	/ʔal**.ħá.**bil/
SR	[**ʔál**walad]	[ʔal**ħá**bil]

In Table 3 above, the final consonant of the trisyllabic word /ʔalwalad/ is rendered extrasyllabic according to the word-final consonant extrasyllabicity (WFCE) rule, given in (5a) earlier, causing the final syllable to be light. Given that the word consists of a heavy syllable followed by two light syllables, stress falls on the antepenultimate syllable according to the word stress assignment (WSA) rule given in (5b). Finally, the extrasyllabicity of the final consonant is revoked yielding [**ʔál**walad]. In contrast, although the final consonant of the disyllabic word /ʔalħabl/ is rendered extrasyllabic, the syllable remains heavy due to the presence of the pre-final consonant /b/, which escapes extrasyllabicity. Given that the word consists of a light syllable followed by a heavy syllable, stress falls on the rightmost heavy syllable, which in this case is the ultimate syllable. The extrasyllabicity of the final consonant is then revoked yielding /ʔal**ħábl**/. However, the final consonant cluster does not conform to the phonotactics of NA, which is repaired by vowel epenthesis breaking up the cluster giving the

surface form [ʔal**há**bil]. The stressed syllable in the underlying representation is preserved in the surface representation because stress assignment occurs earlier in the derivation before vowel epenthesis.

4.2 Word-Final Clusters CvCC vs. Word-Final Geminates CvG

Another case which appears to violate NA stress assignment is observed with words that end with a consonant cluster as opposed to words that end with a geminate. The words in (39) and (40) below all appear to have the same skeletal structure, respectively, yet they behave differently with respect to stress. On the one hand, stress falls on the ultimate syllable as expected for the words in (39a) and (40a), all of which end with a consonant cluster. On the other hand, stress falls unexpectedly on the initial syllable for the words in (39b) and (40b), all of which end with a geminate. In other words, although the final syllable in the sets of data appears to be heavy, it attracts stress in the set containing a word-final consonant cluster, but fails to do so in the set containing a word-final geminate.

(39)	a.	*Regular stress*		b.	*Irregular stress*	
		/ʔal**.kálb**/	“the dog”		/**ʔál.**ʕamm/	“the (paternal) uncle”
		/ʔal**.xúbz**/	“the bread”		/**ʔáð.**ðill/	“the shadow”
		/ʔal**.ħílm**/	“the dream”		/**ʔás.**sadd/	“the dam”
(40)	a.	/ki**.tábt**/	“(I/you) wrote”	b.	/**má.**ħall/	“shop”
		/ðа**.rábk**/	“(he) beat you”		/**tá.**ɣadd/	“eat lunch!”
		/ʃа**.rábt**/	“(I/you) drank”		/**ʔá.**xaff/	“lighter”

The difference in behavior observed in these examples is accounted for by the fact that geminates in NA are degeminated word-finally. In other words, geminates resemble long vowels in the sense that they can be viewed as a single long consonant occupying two consonantal slots, which is shortened word-finally, just as a long vowel occupying two vocalic slots is shortened word-finally (see the example in (4) above). According to this analysis, geminates behave as a singleton or short consonant word-finally and, as a result, the entire word-final shortened geminate becomes accessible to the extrasyllabicity rule (5a) rendering the final syllable light. According to the stress rule in (5b), the initial syllable of the words in (39b) and (40b) is stressed because in (39b) it is the only heavy syllable, whereas in (40b) both syllables are light. In contrast, only the second member of the consonant cluster is accessible to the extrasyllabicity rule, whereas the first member escapes extrasyllabicity thereby maintaining the status of the final syllable as heavy which consequently attracts stress in (39a) and (40a). Once again, the stress algorithm is actually observed by the data in both (39) and (40), as shown by the derivations of /ʔal**.kálb**/ “the dog” and /**ʔál.**ʕamm/ “the (paternal) uncle” in Table 4 below, where the word-final degeminated consonant is parenthesized.

Table 4. Derivation of the words /ʔal.kálb/ "the dog" and /ʔál.ʕamm/ "the (paternal) uncle"

UR	/ʔalkalb/	/ʔalʕam(m)/
WFCE	/ʔalkal<b>/	/ʔalʕa<m>(m)/
Syllabification	/(ʔal)**.**(kal)<b>/	/(ʔal)**.**(ʕa)<m>(m)/
WSA	/(ʔal)**.(kál)**<b>/	/**(ʔál).**(ʕa)<m>(m)/
WFCE Revocation	/ʔal**.kálb**/	/**ʔál.**ʕam(m)/
SR	[ʔal**kálb**]	[**ʔál**ʕam(m)]

It must be noted that the word-final degeminated consonant resurfaces as a geminate upon suffixation, as shown in the following examples, which also show that stress is assigned accordingly.

(41) /ʕamm + -i/ → [**ʕám.**mi] "my (paternal) uncle"
/ðill + -ik/ → [**ðíl.**lik] "your shadow"
/ʔal- + sadd + -een/ → [ʔas**.**sad**.déen**] "the two dams"
/ma**.**ħall + -aat/ → [ma**.**ħal**.láat**] "shops"
/ta**.**ɣadd + -at/ → [ta**.ɣád.**dat] "(she) ate lunch"

4.3 The Triconsonantal Perfective Verb ʔaCv́C-at

Consider the examples in (42) below, all of which consist of three light syllables. As can be seen, the penultimate syllable is stressed instead of the antepenultimate predicted by the stress algorithm.

(42) a. /ʔa**.ká.**l-at/ "(she) ate"
/ʔa**.xá.**ð-at/ "(she) took"
b. /ʔa**.ká.**l-an/ "(they FEM.) ate"
/ʔa**.xá.**ð-an/ "(they FEM.) took"
c. /ʔa**.ká.**l-aw/ "(they MASC.) ate"
/ʔa**.xá.**ð-aw/ "(they MASC.) took"

In order to understand why the penultimate syllable in these verb forms is stressed instead of the antepenultimate, we need to look at verbal forms in NA as they display systematicity in their phonological behavior. According to traditional Arab grammarians, the third person, masculine, singular perfective triconsonantal verb form CvCvC (e.g., /kitab/ "(he) wrote") is considered to be the base or citation form (also known as the unmarked form) because it has no affixes attached to it. However, when a suffix attaches to the base form, an interesting pattern emerges, as can be seen in the following examples.

(43)	*Consonant-initial suffix*		*Vowel-initial suffix*	
a.	/**kí**tab-Ø/	“(he) wrote”	/**ktá**b-at/	“(she) wrote”
	/ki**táb-t**/	“(I/you SG., MASC.) wrote”	/**ktá**b-an/	“(they FEM.) wrote”
	/ki**táb**-na/	“(we) wrote”	/**ktá**b-aw/	“(they MASC.) wrote”
	/ki**táb**-tu/	“(you PL., MASC.) wrote”		
	/ki**táb**-ti/	“(you SG., FEM.) wrote”		
	/ki**táb**-tin/	“(you PL., FEM.) wrote”		
b.	/**sá**ʔal-Ø/	“(he) asked”	/**sʔá**l-at/	“(she) asked”
	/sa**ʔál-t**/	“(I/you SG., MASC.) asked”	/**sʔá**l-an/	“(they FEM.) asked”
	/sa**ʔál**-na/	“(we) asked”	/**sʔá**l-aw/	“(they MASC.) asked”
	/sa**ʔál**-tu/	“(you PL., MASC.) asked”		
	/sa**ʔál**-ti/	“(you SG., FEM.) asked”		
	/sa**ʔál**-tin/	“(you PL., FEM.) asked”		
c.	/**láʕ**ab-Ø/	“(he) played”	/**lʕá**b-at/	“(she) played”
	/la**ʕáb-t**/	“(I/you SG., MASC.) played”	/**lʕá**b-an/	“(they FEM.) played”
	/la**ʕáb**-na/	“(we) played”	/**lʕá**b-aw/	“(they MASC.) played”
	/la**ʕáb**-tu/	“(you PL., MASC.) played”		
	/la**ʕáb**-ti/	“(you SG., FEM.) played”		
	/la**ʕáb**-tin/	“(you PL., FEM.) played”		

The examples in (43) above show that the shape of the base form CvCvC remains intact when it is not followed by a suffix or when a consonant-initial suffix attaches to it. In contrast, attaching a vowel-initial suffix to the base form CvCvC creates the trisyllabic form (Cv)(Cv)(CvC), consisting of light syllables. Forms of this shape are generally avoided in NA by deleting the vowel of the initial syllable according to the rule given in (44) below, known as Trisyllabic Elision (TSE) (Al-Mozainy, 1981; Irshied, 1984; Sakarna, 1999; 2005), which applies to verbal and nominal forms that have the shape CvCvC, thereby creating a word-initial biconsonantal onset.

(44) *Trisyllabic Elision (TSE)*

$C_1vC_2vC_3 \rightarrow C_1C_2vC_3$ / ____ -vC

TSE is unconstrained as it applies indiscriminately to all triconsonantal verbs (and nouns) across the board regardless of what consonants make up the verb. The verbs in (42) above are obviously no exception as they undergo the same process of TSE upon suffixation of a vowel-initial suffix, e.g., /ʔakal + -at/ → [ʔkal-at]. However, the disyllabic form now contains the ill-formed biconsonantal sequence *ʔk- in the onset position, which according to the phonotactics of NA is impermissible. That is, NA consonant co-occurrence constraints do not permit the sequence /ʔC-/ word-initially, though it is permitted

word-medially (e.g., /muʔtamar/ “conference”) and word-finally (/baʔs/ “strength”). The sequence Cʔ-, on the other hand, is unrestricted, as it may occur word-initially (e.g., /sʔal-at/ “(she) asked”), word-medially (e.g., /masʔala/ “issue”), and word-finally (e.g., /bitʔ/ “slowness”). The ill-formed sequence *ʔk- is resolved by NA well-formedness constraints by invoking the rule in (45) below (Al-Mozaini, 1981), which epenthesizes a vowel to break up the ill-formed onset consonant cluster yielding [ʔakal-at].

(45) *Well-Formedness Rule: Word-Initial Onset Vowel Epenthesis (OVE)*

Ø → [+syll] / #ʔ ____ C

However, the question yet still remains as to why the penultimate syllable is stressed instead of the antepenultimate. The answer is that the assignment of stress in NA generally occurs at an early stage of a word’s derivation before the application of any other phonological processes, as shown in the derivation of /**ktá**bat/ “(she) wrote” and /ʔa**ká**l-at/ “(she) ate” in Table 5 below.

Table 5. Derivation of the words /ktábat/ “(she) wrote” and /ʔakál-at/ “(she) ate”

UR	/kitabat/	/ʔakalat/
WFCE	/kitaba<t>/	/ʔakala<t>/
Syllabification	/(ki)**.**(ta)**.**(ba)<t>/	/(ʔa)**.**(ka)**.**(la)<t>/
WSA	/**(kí).**(ta)**.**(ba)<t>/	/**(ʔá).**(ka)**.**(la)<t>/
WFCE Revocation	/**kí.**ta**.**bat/	/**ʔá.**ka**.**lat/
TSE	/**ktá.**bat/	/**ʔká.**lat/
OVE	—— N/A ——	/ʔa**.ká.**lat/
SR	[**ktá**bat]	[ʔa**ká**lat]

As can be seen in Table 5, stress applies at an early stage which correctly assigns stress to the antepenultimate syllable. The vowel of the initial syllable is then deleted as a result of attaching a vowel-initial suffix, which causes stress to shift to the next available nucleus. In the case of /ʔkalat/, the resulting form contains the impermissible word-initial onset sequence *ʔk- thereby triggering the application of the well-formedness rule in (45), which breaks up the ill-formed sequence by inserting a vowel. The form finally surfaces as [ʔa**ká**lat] preserving the underlying form stress. It must be noted that for some NA speakers, the initial syllable is deleted altogether, e.g., /**ká**lat/ and /**xá**ðat/. This occurs only with triconsonantal verbs that begin with a glottal stop /ʔ/, which are generally not very common.

4.4 The Triconsonantal Imperfective Verb ʔa-Cv́CvC

The last set of examples that appear to have exceptional stress is given in (46) below, which, as with the examples in the previous subsection, display penultimate stress instead of the expected antepenultimate stress.

(46) /ʔa-**.xá.**biz/ “(I) bake”
/ʔa-**.ɣá.**rif/ “(I) scoop”
/ʔa-**.ħá.**sib/ “(I) think”
/ʔa-**.ʕá.**zim/ “(I) invite”
/ʔa-**.há.**riʤ/ “(I) speak”

Once again, these examples display an interesting and unique NA phonological pattern that emerges as the result of attaching subject prefixes to the triconsonantal imperfective verb stem CCvC. This pattern, illustrated in the examples in (47) below, shows a contrast between verbs that begin with a guttural (G) consonant (i.e., /x, ɣ, ħ, ʕ, h/) and those that begin with a non-guttural consonant.

(47)	Non-*Guttural-Initial Stem (CCvC)*		*Guttural-Initial Stem (GCvC)*	
a.	/**ʔá-k**tib/	“(I) write”	/ʔa-**xá**biz/	“(I) bake”
	/**tá-k**tib/	“(you SG., MASC.) write”	/**t-xá**biz/	“(you SG., MASC.) bake”
	/**yá-k**tib/	“(he) writes”	/**y-xá**biz/	“(he) bakes”
	/**ná-k**tib/	“(we) write”	/**n-xá**biz/	“(we) bake”
b.	/**ʔá-s**ʔal/	“(I) ask”	/ʔa-**ɣá**rif/	“(I) scoop”
	/**tá-s**ʔal/	“(you SG., MASC.) ask”	/**t-ɣá**rif/	“(you SG., MASC.) scoop”
	/**yá-s**ʔal/	“(he) asks”	/**y-ɣá**rif/	“(he) scoops”
	/**ná-s**ʔal/	“(we) ask”	/**n-ɣá**rif/	“(we) scoop”
c.	/**ʔá-l**ʕab/	“(I) play”	/ʔa-**ħá**sib/	“(I) think”
	/**tá-l**ʕab/	“(you SG., MASC.) play”	/**t-ħá**sib/	“(you SG., MASC.) think”
	/**yá-l**ʕab/	“(he) plays”	/**y-ħá**sib/	“(he) thinks”
	/**ná-l**ʕab/	“(we) play”	/**n-ħá**sib/	“(we) think”
d.	/**ʔá-f**taħ/	“(I) open”	/ʔa-**ʕá**zim/	“(I) invite”
	/**tá-f**taħ/	“(you SG., MASC.) open”	/**t-ʕá**zim/	“(you SG., MASC.) invite”
	/**yá-f**taħ/	“(he) opens”	/**y-ʕá**zim/	“(he) invites”
	/**ná-f**taħ/	“(we) open”	/**n-ʕá**zim/	“(we) invite”
e.	/**ʔá-ʃ**rab/	“(I) drink”	/ʔa-**há**riʤ/	“(I) speak”
	/**tá-ʃ**rab/	“(you SG., MASC.) drink”	/**t-há**riʤ/	“(you SG., MASC.) speak”
	/**yá-ʃ**rab/	“(he) drinks”	/**y-há**riʤ/	“(he) speak”
	/**ná-ʃ**rab/	“(we) drink”	/**n-há**riʤ/	“(we) speak”

These examples show that when the subject prefixes /ʔa-, ta-, ya-, na-/ attach to a verb stem that begins with a non-guttural consonant, the stem remains intact. In contrast, attaching these prefixes to a verb stem that begins with a guttural consonant causes the initial guttural consonant of the stem to metathesize with the vowel of the prefix thereby changing the stem from CCvC to CvCvC according to the rule in (48) below (Al Sweel, 1990).

(48) *Guttural Metathesis (GM)*

Cv+GCvC → C+GvCvC

The application of the Guttural Metathesis rule creates a complex onset (i.e., CCvCvC) word-initially that conforms to the phonotactics of NA except in the case of the prefix /ʔa-/, where the consonantal sequence *ʔC- is produced, e.g., *ʔxabiz, which as mentioned earlier is impermissible in NA. As with the examples in the previous subsection, this ill-formed consonantal sequence is repaired by the well-formedness rule in (45) above, which epenthesizes a vowel to break up the ill-formed onset consonant cluster yielding [ʔa-xabiz]. Thus, the placement of stress on the penultimate syllable instead of the antepenultimate follows from the exact same analysis mentioned earlier. That is, metathesis and epenthesis occur postlexically after the assignment of stress. As a result, the placement of stress in the underlying structure is preserved in the surface structure, as shown in the derivations of /**ʔá-k**tib/ "(I) write", /**y-xá**biz/ "(he) bakes", and /ʔa-**xá**biz/ "(I) bake" in Table 6 below.

Table 6. Derivation of the words /ʔá-ktib/, /y-xábiz/, and /ʔa-xábiz/

UR	/ʔaktib/	/yaxbiz/	/ʔaxbiz/
WFCE	/ʔakti<b>/	/yaxbi<z>/	/ʔaxbi<z>/
Syllabification	/(ʔak)**.**(ti)<b>/	/(yax)**.**(bi)<z>/	/(ʔax)**.**(bi)<z>/
WSA	/**(ʔák).**(ti)<b>/	/**(yáx).**(bi)<z>/	/**(ʔáx).**(bi)<z>/
WFCE Revocation	/**ʔák.**tib/	/**yáx.**biz/	/**ʔáx.**biz/
GM	—— N/A ——	/**yxá.**biz/	/**ʔxá.**biz/
OVE	—— N/A ——	—— N/A ——	/ʔa**.xá.**biz/
SR	[**ʔák**tib]	[**yxá**biz]	[ʔa**xá**biz]

To sum up, I have discussed in this section cases in NA that appear on the surface to have stress assigned counter to the stress algorithm proposed in this paper. I have shown that these seemingly exceptional cases are not exceptional at all as they follow the exact same stress algorithm that operates in NA and that the occurrence of stress on an unexpected syllable is due to the fact that stress assignment applies at an early stage before the application of any other phonological processes that consequently alter the shape of the word. As a result, the placement of stress in the underlying representation is preserved in the surface representation.

5. Variations within NA

Since NA is spoken over a relatively vast area (approximately 554,000 km^2), there are a number of sub-dialects contained under the umbrella of NA all of which share many linguistic features, but nevertheless differ slightly from each other. Therefore, they are considered to be variants of NA. Variations between NA sub-dialects may include the use of different lexical items, e.g., /naayim ~ raagid/ "asleep", /ʕazamt ~ naadeet/ "(I/you) invited". Other variations include differences in the quality of vowels, e.g., /madrasah ~ midrisih/ "school", /maʕak ~ miʕik/ "with you"; differences in affixes, e.g., /ʃif-t-ah ~ ʃif-t-uh/ "(I/you) saw him", /ʃif-t-aha ~ ʃif-t-ah/ "(I/you) saw her"; differences in the position of a deleted vowel, e.g., /musik/ → [misk ~ msik] "(he) was caught", among others. Most of these variations are subtle and are usually undetected by non-NA speakers or outsiders. More importantly, these variations between the NA sub-dialects have no bearing whatsoever on the assignment of stress as it follows the same stress algorithm proposed in this paper. As I have shown in the previous section, any superficial differences observed in the placement of stress are basically due to the fact that certain phonological processes alter the shape of a word after stress has already been assigned and not because some sub-dialects have a different stress algorithm. In this section I will discuss some of these variations and show that they all follow the same stress algorithm.

Consider for example the variations in the pronunciation of "(he) followed her" given in (49) below. In each of these forms, stress falls on the penultimate syllable, which is what we expect for (a) and (b), but not for (c).

(49) a. /(la)**.(ħág).**(ha)/
b. /**(lhá).**(gah)/
c. /(laħ)**.(gá).**(ha)/

These variations are accounted for by the derivations given in Table 7 below. As can be seen, the final consonant of each form is first rendered extrasyllabic (where applicable), followed by syllabification in preparation for stress assignment. The penultimate syllable in (49a) is stressed since it is the only heavy syllable and the form surfaces as [la**ħág**ha]. The form in (49b) consists of three light syllables, so stress falls on the antepenultimate. However, attaching the vowel-initial suffix /-ah/ to the CvCvC-shaped stem triggers the application of the TSE rule in (44) above, which deletes the vowel of the initial syllable causing stress to shift to the next available vowel. The form is then resyllabified surfacing as [**lhá**gah]. The form in (49c) follows the same derivation as (49a), however, for the speakers of this variant, attaching the consonant initial suffix /-ha/ causes the stem-final consonant /g/ to metathesize with the preceding vowel (according to the rule in (50) below), which in turn causes the onset of the second syllable /ħ/ to resyllabify as the coda of the initial syllable. The form eventually surfaces as [laħ**gá**ha] preserving its underlying stress placement.

(50) *Stem-Final Consonant Metathesis (SFCM)*

$C_1vC_2vC_3 \rightarrow C_1vC_2C_3v$ / ____ -Cv

Table 7. Derivation of the words /la**ħag**-ha/**,** /**lh**á**g**-ah/**, and** /laħ**gá**-ha/

UR	/laħagha/	/laħagah/	/laħagha/
WFCE	—— N/A ——	/laħaga<h>/	—— N/A ——
Syllabification	/(la)**.**(ħag)**.**(ha)/	/(la)**.**(ħa)**.**(ga)<h>/	/(la)**.**(ħag)**.**(ha)/
WSA	/(la)**.(ħág).**(ha)/	/**(lá).**(ħa)**.**(ga)<h>/	/(la)**.(ħág).**(ha)/
WFCE Revocation	—— N/A ——	/**lá.**ħa**.**gah/	—— N/A ——
TSE	—— N/A ——	/**l.há.**gah/	—— N/A ——
SFCM	—— N/A ——	—— N/A ——	/la**.hgá.**ha/
Resyllabification	—— N/A ——	/**(lhá).**(gah)/	/(laħ)**.(gá).**(ha)/
SR	[la**hág**ha]	[**lhá**gah]	[laħ**gá**ha]

Note that the TSE rule is inactive for the speakers of forms (49a) and (49c), whereas the SFCM rule is inactive for the speakers of forms (49a) and (49b).

The examples in (51) below for "(he) spoke to her" display a similar pattern of variation.

(51) a. /(kal)**.(lám).**(ha)/

b. /**(kál).**(la)**.**(mah)/

c. /(kal)**.(má).**(ha)/

For the forms in (a) and (b), stress falls on the syllable predicted by the stress rule, i.e., the rightmost heavy syllable, whereas in (c) stress unexpectedly falls on the penultimate light syllable instead of the designated heavy antepenultimate. As with the previous examples, the shape of the form in (c) has been phonologically altered by the metathesis rule in (50) above after the assignment of stress. That is, attaching the consonant initial suffix /-ha/ causes the stem-final consonant /m/ to metathesize with the preceding vowel, i.e., /kall**ám**ha/ → /kall**má**ha/. This process results in a word medial consonant cluster consisting of the geminate /ll/ and /m/. According to NA well-formedness constraints, geminates may occur only intervocalically in word-medial position. This is repaired by the well-formedness rule in (52) below, which causes /ll/ to degeminate when immediately followed by another consonant word-medially, as shown in the derivation in Table 8 below.

(52) *Well-Formedness Rule: Word-Medial Degeminatiom*

$C_iC_i \rightarrow C_i$ / ____ C_j

Table 8. Derivation of the words /ʔá-ktib/, /y-xábiz/, and /ʔa-xábiz/

UR	/kallamha/	/kallamah/	/kallamha/
WFCE	—— N/A ——	/kallama<h>/	—— N/A ——
Syllabification	/(kal)**.**(lam)**.**(ha)/	/(kal)**.**(la)**.**(ma)<h>/	/(kal)**.**(lam)**.**(ha)/
WSA	/(kal)**.(lám).**(ha)/	/**(kál).**(la)**.**(ma)<h>/	/(kal)**.(lám).**(ha)/
WFCE Revocation	—— N/A ——	/**kál.**la**.**mah/	—— N/A ——
Metathesis	—— N/A ——	—— N/A ——	/kal**.lmá.**ha/
Degemination	—— N/A ——	—— N/A ——	/kal**.má.**ha/
SR	[kal**lám**ha]	[**kál**lamah]	[kal**má**ha]

Finally, consider the examples in (53) below for "(she) told him". In (a), the initial heavy syllable is not within the range of stress assignment, i.e., it is not one of the words last three syllables, so stress falls as expected on the antepenultimate syllable. In (b) however, although the initial heavy syllable is within the range of stress assignment, stress falls unexpectedly on the penultimate light syllable.

(53) a. /(ʕal)**.(lá).**(ma)**.**(tah)/

b. /(ʕal)**.(mí).**(tuh)/

As with the previous examples, the shape of the form in (b) has been phonologically altered after the assignment of stress. This is shown in the derivation in Table 9 below. For the form in (a), the final consonant is first isolated as extrasyllabic. The form is then syllabified and stress is assigned to the antepenultimate accordingly. The extrasyllabicity of the final consonant is then revoked yielding the surface form [ʕal**lá**matah]. The form in (b) undergoes the same process up to the extrasyllabicity revocation. However, attaching the vowel initial suffix /-uh/ "him" to the base form /ʕallamit/ gives /ʕallamituh/, where the shape (Cv)(Cv)(CvC) is created word-finally, i.e., /ʕal(la)(mi)(tuh)/. As mentioned earlier, this is a shape that generally tends to be avoided in NA, which is obviously the case for the speakers of this variety. As a result, the TSE rule in (44) above is invoked, which deletes the vowel in the initial syllable of the trisyllabic shape (Cv)(Cv)(CvC) yielding disyllabic (CCv)(CvC) causing stress to shift to the next available vowel, i.e., /ʕal**(lá)**(mit) + -uh/ → /ʕal**(lmí)**(tuh)/. This creates a word-medial triconsonantal cluster consisting of the geminate /ll/ followed by /m/, which as we have seen in the previous examples, violates NA well-formedness constraints that require geminates to occur intervocalically in word-medial positions. As a result, the geminate /ll/ is degeminated yielding the surface form [ʕal**mí**tuh] preserving the stress placement of the underlying form.

Table 9. Derivation of the words [ʕallámatah] and [ʕalmítuh]

UR	/ʕallamatah/	/ʕallamituh/
WFCE	/ʕallamata<h>/	/ʕallamitu<h>/
Syllabification	/(ʕal)**.**(la)**.**(ma)**.**(ta)<h>/	/(ʕal)**.**(la)**.**(mi)**.**(tu)<h>/
WSA	/(ʕal)**.(lá).**(ma)**.**(ta)<h>/	/(ʕal)**.(lá).**(mi)**.**(tu)<h>/
WFCE Revocation	/ʕal**.lá.**ma**.**tah/	/ʕal**.lá.**mi**.**tuh/
TSE	—— N/A ——	/ʕal**.l.mí.**tuh/
Degemination	—— N/A ——	/ʕal**.mí.**tuh/
SR	[ʕal**lá**matah]	[ʕal**mí**tuh]

Notice that the form /ʕallamit/ contains the vowel-initial suffix /-it/ "she", however, the TSE rule is not triggered because its condition is not met. That is, adding /-it/ to /ʕallam/ will not create the trisyllabic shape (Cv)(Cv)(CvC). Furthermore, the two forms in (53) show that there are variations between NA sub-dialects in the application of certain phonological processes. That is, in this particular environment, the TSE rule appears to be active for the speakers of form (b), but inactive for the speakers of form (a), though it may be operative elsewhere. Thus, pronunciation variations between NA sub-dialects follow from variations in the applicability of phonological processes.

7. Conclusion

This paper has presented a detailed and unified analysis of word stress in NA. The proposed analysis is based on two principles. First, unlike previous studies that employ a three-way weight distinction between light, heavy, and superheavy syllables, a binary weight distinction between light (monomoraic) C(C)v; and heavy (bimoraic) C(C)vX(C) is proposed, where "X" stands for either a vowel or a consonant. Second, word-final consonants are crucially assumed to be "extrasyllabic" as they do not contribute to syllable weight.

Since stress in NA never falls on a pre-antepenultimate syllable, the NA stress algorithm in (5b) above repeated in (54) below is constrained so that stress may fall on one of the last three syllables of the word.

(54) Stress the rightmost heavy syllable if and only if it is one of the word's last three syllables; otherwise stress the antepenultimate syllable (initial syllable in disyllabic words).

The interaction of the stress algorithm in (54) with the extrasyllabicity condition accounts for all the stress patterns in NA. Moreover, cases that seemingly appear to have exceptional stress are not exceptional at all as they follow the exact same stress algorithm above. The occurrence of stress on an unexpected syllable in these cases is due to the fact that stress assignment applies earlier in the derivation before the application of any other phonological processes that subsequently alter the shape

of the word. As a result, the placement of stress in the underlying representation is preserved in the surface representation. This is also true for the variations that exist within NA itself.

Although previous analyses of stress in NA may account for NA stress patterns (though they are not without flaws), they do so by positing a set of redundant sub-rules where the conditions for each sub-rule is explicitly specified to account for a subset of NA stress patterns and exclude others that do not meet the conditions specified in the sub-rule. In contrast, the analysis I propose here accounts for both regular stress and also for cases that appear to be exceptional in a simple and straightforward manner without resorting to redundant or unnecessary stipulations. In accordance with the general principle in science that simplicity is a virtue in scientific theories, the simplest of competing theories is preferred to the more complex ones, all other things being equal.

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