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STRESS PATTERNS OF BEDOuin HIJAZI ARABIC: An OT Account

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Abstract Viewing Bedouin Hijazi Arabic stress system as being quantity-sensitive, rightward and nonfinal (cf. Al-Mozainy (1981)), I show that general constraints formulated in Prince and Smolensky (1993) derive the BHA stress patterns in much simpler way. An implication of this analysis is that at least two levels of representation should be separately constrained to deal with the cases showing identical syllable structures but non-identical stress patterns in the surface.


   In this paper I will provide an optimality-theoretic analysis for stress patterns of Bedouin Hijazi Arabic (BHA) dialect. Most of the data and their previous analysis come from Al-Mozainy (1981) who has accounted for the BHA stress patterns within a rule-based framework. This section introduces the Al-Mozainy’s description and analysis of the BHA stress system.

   In BHA, stress falls on one of the last three syllables. Stress falls on the final syllable if it is superheavy (CV-C or CVCC) (S: superheavy, H: heavy, L: light syllable).

   (1) a. HS  maknūn (written)
      b. LS  darābī (I hut)

   If the final syllable is not superheavy and the penultimate is heavy (CV or CVC), the penultimate receives stress.

   (2) a. HHH  maknūn (tied for s 
      b. HHL  ga bīna (meet us)

   If the final syllable is not superheavy and the penultimate is not heavy, stress falls on the antepenultimate.

   (3) a. HLL  mā lana (our property)
      b. HHL  yāsrībīn (they (f.) drink)

   In bisyllabic words stress falls on the penultimate if the final syllable is not superheavy.

   (4) a. LHL  kītab (he wrote)

Kansas Working Papers in Linguistics 23-1, pp 17-26
b. LL 纳斯 (he raided)

Monosyllabic words receive stress on their vowel.

(5) a. है  माॉ (with)
   है (for me)

In addition to these basic stress patterns, BHA has several problematic cases. The first is some words with HLH pattern. According to the Al-Mozainy’s generalization in (3) above, these words are expected to get stress on the antepenult, but, for example, निर्माण is stressed on its penult. For these cases, Al-Mozainy (1981) assumes that stress is assigned to underlying representation, and that some phonological processes follow the stress assignment rules. In the case of निर्माण, the vowel उ is epenthized in the final syllable after the stress is underlyingly assigned on the final superheavy syllable.

(6) परिनाम (the afternoon)
   परिनाम (stress assignment)
   परिनाम (epenthesis)
   परिनाम

Some words with I.I. in (7) are apparently unproblematic because the antepenultimate stress is expected in words with nonsuperheavy ultima and nonheavy penult.

(7) जालू (the brother)
    जालू (the father)

But, assuming that stress is assigned on the underlying representation, the underlying forms of these words have H.I. syllable (Al-Mozainy (1981)). The words in (7) are nouns prefixed with एल (‘the’). Without एल, the words are as follows.

(8) जालू (brother)
    जालू (father)

The word-initial glottal stop in (8) is deleted when preceded by a prefix which ends with a consonant. So the seemingly straightforward examples have some complications as shown in the following derivation.

(9) परिनाम (the brother)
    परिनाम (stress assignment)
    जालू (T-deletion)
    जालू (vowel raising)
    जालू
BHA has many words with penultimate stress on the syllable patterns LLL or LLH where Al-Mozainy expects antepenultimate stress.

(10) a. ʔaʔadi (I am running)
   b. ʔaʔadat (she took)
   c. ʔumara (princess)

The underlying forms of the words in (10) are not different from the surface forms, so we cannot resort to the assumption that it is the underlyingly-assigned stress. Al-Mozainy modifies his assumption that stress is assigned only in the underlying representation. A stress assignment rule is decomposed into the separate rules, as in (1) to (5) above, and these rules are applied in that order. If an underlyingly-stressed vowel is deleted in the course of phonology, the next stress assignment rule is applied.

(11) ʔaʔadat  (she took)
      ʔaʔadat stress assignment (3)
      ʔadat low vowel deletion
      ʔadat stress assignment (4)
      ʔadat initial vowel epenthesis
      [ʔadat]

Low vowel deletion is applied in two consecutive open syllables with low vowel and the first low stressed vowel is deleted. The stressed vowel being deleted, stress is reassigned by the stress assignment (4). Finally a vowel is epenthesized in the environment, #ʔ_;_C.

The same thing applies to (10a).

In (10c), however, since the first vowel is not a low vowel, low vowel deletion rule cannot be applied. Instead, Al-Mozainy posits high vowel deletion followed by vocalization of the first glottal stop before a consonant and a glottal stop insertion.

(12) ʔumara  (princess)
      ʔumara stress assignment (3)
      ʔumara high vowel deletion
      ʔumara stress assignment (4)
      umara ? → w
      umara vocalization
      ʔumara ?-insertion
      [ʔumara]

For motivating the vocalization of the glottal stop, Al-Mozainy (1981) states that /ʔ/ sporadically, changes to a glide when it is adjacent to another consonant, and sometimes
freely (p. 167),” as shown in *ummar* (he ordered, /?amar/) and *yisar* (to imprison, /?asat/), and that “there is a variant for ‘princes’ in which /?/ is realized as [w] on the surface *ummar* (p. 167).”

Note that in the derivations (11) and (12) the underlying forms and the surface forms are identical. In order to explain the penultimate stress in these words, Al-Mozamiy assumes several rules and the complicated derivations, which end up with the original forms. Also, his statement about the existence of the variant *ummar* does not seem to motivate the fact that the same vocalization process is applied to the other variant *immar*.

Lastly, SLI stressed in the penultimate is another problematic case because antepenultimate stress is expected in this syllable pattern.

(13) a ʾi?xṭabawr (they m.) took an exam, /i?xṭabawr/)
   b ʾi?nsarāt (she got broken, /i?nsarāt/)

These cases have been presented as evidence for foot structure and for the assumption that the foot preserves stress (Al-Mozaimy 1981, Al-Mozaimy et al. 1985).

(14) /i?nsarāt/ (she got broken)
    ʾi?nsarāt stress assignment (3)
    ʾi?nsarāt foot formation
    ʾi?nsarāt low vowel deletion
    ʾi?nsarāt stress shift within a foot
    [ʾi?nsarāt]

2. An OT Account

Viewing the BHA stress patterns in a different way from Al-Mozaimy (1981) and Al-Mozaimy et al. (1985), I will show that general constraints formulated in Prince and Smolensky (1993) account for the BHA stress system in a very simple way. The several problematic patterns discussed in the last section are mostly explained by positing an input-output faithfulness constraint on stress peak and two-level evaluations of input and output faithfulness.

I view the BHA stress patterns as showing quantity-sensitivity, rightmost directionality and non-finality: (1) superheavy syllable receives stress regardless of its position; (II) rightmost heavy syllable receives stress unless it is in the word-final position; (III) if there is neither superheavy nor heavy syllable, the penult receives stress by default. The following constraints and constraint ranking are formulated.

(15) Š Stress superheavy syllables.
H. Stress heavy syllables

*σηθη: No stress on more than the fourth syllable from the end of a word

RIGHTMOST: Stress the rightmost syllable

NONFINALITY: Stress must not fall on the word-final syllable

CULMINATIVITY: There must be a single syllable that is the most prominent.

(16) *σηθη, CULMINATIVITY >> $ >> NONFINALITY >> H >> RIGHTMOST

The constraints *σηθη and CULMINATIVITY are undominated. By high ranking of $, super-heavy syllable receives stress wherever it is situated. Ranking NONFINALITY >> H >> RIGHTMOST says that penultimate heavy syllable would receive stress if there are more than one heavy syllable in a word. NONFINALITY >> RIGHTMOST says that if there is neither super-heavy nor heavy syllable, the penult would receive stress by default.

These constraints and constraint ranking derive the basic stress patterns discussed in section 1. First, in CVC.CV.C.

(17) maktuš (written), darāt (1 bit)

\[
\begin{array}{|c|c|c|c|c|c|}
\hline
\text{CVC CV C} & \text{σηθη} & \text{CUL} & \text{$$} & \text{NONFIN} & \text{H} & \text{RM} \\
\hline
\text{CVC CV C} & & * & & * & & * \\
\hline
\text{>CVC CV C} & & * & & * & & * \\
\hline
\end{array}
\]

since $ >> NONFINALITY, the candidate with stress on its final super-heavy syllable is selected as an optimal output.

In CVC.CV.CV. pattern,

(18) maktuš (tied if $ s), gaššina (meet us (m.s.))

\[
\begin{array}{|c|c|c|c|c|c|}
\hline
\text{CVC CV.C} & \text{σηθη} & \text{CUL} & \text{$$} & \text{NONFIN} & \text{H} & \text{RM} \\
\hline
\text{CVC CV.C} & & & * & & * & \\
\hline
\text{>CVC CV.C} & & & * & & * & \\
\hline
\text{CV.C CV.C} & & * & & * & & * \\
\hline
\end{array}
\]

the candidate with stress on the second syllable wins over the candidate with stress on the first syllable, due to the better satisfaction of RIGHTMOST.

The patterns $IL and H.H will be explained by H and NONFINALITY, the bisyllabic words IL and LL are by NONFINALITY, and the monosyllabic words H and L are by CULMINATIVITY.

Let us consider the problematic cases discussed in the last section. First, consider the pattern H.H. The ranking NONFINALITY >> H proposed in (16) will select the
candidate with stress on the antepenultimate as optimal, correctly predicting the stress patterns in (19).

(19) a. ma’alana (our property)
     b. yahvishim (they (f) drink)

Then how could we account for (20) below which has the same syllable structure with the data in (19) but shows penultimate stress rather than the expected antepenultimate stress?

(20) *al’Asur (the afternoon)

It does not seem to be possible to account for (19) and (20) in terms of one-level output evaluation. Because they have the same syllable structures in their output forms but show different stress patterns. I propose that a faithfulness constraint which requires preserving the input peak to the output outranks any contrast relevant to the stress assignments, and that two levels of representation be separately constrained to deal with the cases showing identical syllable structures but nonidentical stress patterns in the surface.

(21) FAITH-PK. If a segment is the stress peak of the input, it is the stress peak of the output.

(22) FAITH-PK. CULMINATIVITY >> S >> NONFINALITY >> H >> RIGHTMOST

Assuming a highly-ranked constraint INSERTION forcing the vowel insertion between the word-final consonant clusters, the correct output form *Al’Asur is derived through the two-stage evaluations as shown in (23).

(23) a. Constraining input

<table>
<thead>
<tr>
<th>al’Asur</th>
<th>*</th>
<th>CUL</th>
<th>S</th>
<th>NONFIN</th>
<th>H</th>
<th>RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>al’asur</td>
<td></td>
<td>*</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b. Constraining input-output faith

<table>
<thead>
<tr>
<th>al’Asur</th>
<th>FAITH-PK</th>
<th>*</th>
<th>CUL</th>
<th>S</th>
<th>NONFIN</th>
<th>H</th>
<th>RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>al’asur</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td>*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In (23b) even though the candidate *Al’asur constitutes more violations of the constraint H than the other candidate on the surface, it wins since the stressed vowel in the input form is still the stress peak of the output.
This seems to be a problematic situation for the correspondence theory developed by Bensa (1995), Kager (1996) and McCarthy and Prince (1995) according to which a direct surface-to-surface relation between stems and morphologically complex words are evaluated. What is needed for the BHA case is constraining input forms themselves.

The surface pattern LLI with antepenultimate stress as in (24) is also the case in which a segment which is the stress peak of the input remains the stress peak of the output.

(24) ?alaxu (the brother)
?alibbu (the father)

<table>
<thead>
<tr>
<th>2al 2a xu</th>
<th>*sosos</th>
<th>CUL</th>
<th>S</th>
<th>NONFIN</th>
<th>H</th>
<th>RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2al 2a xu</td>
<td>*sosos</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>2al 2a xu</td>
<td>*sosos</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

b. Constraining input-output faith

<table>
<thead>
<tr>
<th>2al 2a xu</th>
<th>FAITH-PK</th>
<th>*sosos</th>
<th>CUL</th>
<th>S</th>
<th>NONFIN</th>
<th>H</th>
<th>RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2al 2a xu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>2al 2a xu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

Remember the syllable structure LLI of LLH with penultimate stress for which Al-Mozainy assumed (i) the deletion of the vowel in the first syllable, (ii) stress assignment on the penult, (iii) the deletion of the word-initial glottal stop, (iv) the revival of the vowel in the first syllable, and (v) the revival of the word-initial glottal stop ((1) and (2) above).

(26) a. ?al&id; (I am running)
b. ?umara (princess)

These are simply followed from our generalization: The constraints NONFINALITY >> RIGHTMOST would select the candidate with stress on the penultimate CV in the CV CV CV words.

The surface syllable pattern SLH with penultimate stress was the pattern for which Al-Mozainy has argued for the foot structure and the foot preserves stress.

(27) ?inkasarat (she got broken, /?inkasarat/)

This is just the case in which the input peak is faithful to the output peak, as shown in the following tables. Note that we do not resort to any foot structure to explain this case (cf. Al-Mozainy (1981), Al-Mozainy et al. (1985)).
(28) a. Constraining input

<table>
<thead>
<tr>
<th>ʔim ka sa rat</th>
<th>*ðððð</th>
<th>CUL</th>
<th>Š</th>
<th>NONFIN</th>
<th>H</th>
<th>RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ʔim ka sa rat</td>
<td>*?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; ʔim ka sa rat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b. Constraining input-output faith

<table>
<thead>
<tr>
<th>ʔim ka sa rat</th>
<th>FAITH-PK</th>
<th>*ðððð</th>
<th>CUL</th>
<th>Š</th>
<th>NONFIN</th>
<th>H</th>
<th>RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; ʔink sa rat</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>&gt; ʔink sa rat</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
<td></td>
<td>*</td>
<td>**</td>
</tr>
</tbody>
</table>

One more case worth mentioning is the surface pattern ʔʔ. Consider the following derivations which Al-Mozainy (1981) suggests.

(29) /sairbat/  (she drank)
     saibat  stress assignment (3)
     saibat  vowel deletion
     [sairbat]

(30) /katabat/  (she wrote)
     katabat  stress assignment (3)
     katabat  low vowel deletion
     katabat  stress assignment (4)
     katabat  vowel raising
     [katabat]

This is the case in which the stressed vowel in the input undergoes deletion. With the deletion of the segment with the input peak, the constraint CULMINATIVITY will still require a peak in the word.

(31)

<table>
<thead>
<tr>
<th>kař.bat</th>
<th>FAITH-PK</th>
<th>*ðððð</th>
<th>CUL</th>
<th>Š</th>
<th>NONFIN</th>
<th>H</th>
<th>RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>kař.bat</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; kař.bat</td>
<td></td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

The deletion of the input segment / with the stress peak causes FAITH-PK violation. Then the same ranking which constrained the input form evaluates the output, selecting the form with stress on the penult correctly.

3. Conclusion
In conclusion, I have proposed the following model for the BHA stress patterns.

\[(32) \quad \text{INPUT} \leftarrow *\text{ọọọọ, CUL} \gg \text{S} \gg \text{NONFIN} \gg \text{H} \gg \text{RGT} \]
\[\text{← FAITH-PK, } *\text{ọọọọ, CUL} \gg \text{S} \gg \text{NONFIN} \gg \text{H} \gg \text{RGT} \]

\[\text{OUTPUT} \]

What is missing here is comparison among Arabic dialects. Palestinian Arabic, among other dialects, has similar stress patterns with the ones of BHA. (i) Stress falls on the rightmost heavy syllable of the word, (ii) a stress must appear on one of the final three syllables of the word, (iii) if there is no heavy syllable within three syllables from the end of the word, the antepenult gets stress, and (iv) the final syllable never gets stress (Kernstowicz (1983)).

\[(33) \quad \begin{array}{ll}
\text{b'ar} & \text{('bless' 3sg.m.)} \\
\text{b'ar} & \text{ku} \quad \text{(3pl)} \\
\text{b'ar} & \text{kat} \quad \text{(3sg.f.)} \\
\text{b'ar} & \text{kat} \text{na} \quad \text{(3sg.f. -us)} \\
\text{b'ar} & \text{kat} \text{u} \quad \text{(3sg.f. -him)} \\
\end{array} \]

Palestinian Arabic can be explained by the constraints and the constraint ranking shown in (34) below.

\[(34) *\text{ọọọọ, NONFINALITY} \gg \text{H} \gg \text{LEFTMOST} \]

The similar constraints and constraint ranking seem to account for the Palestinian Arabic stress patterns, except the constraints designating the left or rightward directionality.

NOTES

1 Bedouin Arabic is the dialect spoken in the Hijaz, Saudi Arabia (Al-Mozainy et al. (1985)).

2 Some of the symbols used in the text represent the following: s. voiceless alveolar emphatic sibilant, r. emphatic r. s. voiceless palatoalveolar fricative (Al-Mozainy (1981)).

3 According to Al-Mozainy (1981), an epenthetic vowel is inserted between two consonants when a word ends with a consonant cluster of an obstruent and a sonorant.
REFERENCES


