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Introducing Weight-Sensitive EDGEMOST

Abstract

An Optimality Theoretic account of stress in Jordanian Arabic (JA) is proposed using LAPSE and EDGEMOST constraints. The proposal is based on treatment of EDGEMOST as a weight-sensitive alignment constraint (McCarthy & Prince 1993a). Accordingly, a constraint demanding alignment of a heavy stressed syllable to the rightmost or leftmost edge of a prosodic word and another demanding the alignment of a light stressed syllable to the rightmost or leftmost edge of a prosodic word are independently active constraints in any grammar. The interaction of these constraints with an edge oriented LAPSE along with a variety of stress-related constraints accounts for the stress pattern in JA. The proposal provides a straightforward mechanism for categorizing stress systems as weight-sensitive or weight-insensitive and further dividing weight-sensitive systems as exhibiting a default to the same or default to the opposite pattern. JA is categorized as exhibiting a default to the same side stress pattern.

1. Introduction

Iterative foot construction was proposed within generative phonology to account for stress assignment in systems that lack secondary stress (Halle & Vergnaud 1987; Idsardi 1992; Hayes 1995). This process relies on the notion of serial derivation and thus intermediate stages. Line Conflation was then devised to disallow intermediate feet from being stressed. Since OT (Prince & Smolensky 1993/2002; McCarthy & Prince 1993a, 1993b) does not accommodate intermediate stages of derivation, a number of accounts within OT have been proposed to handle the undesired residue of iterative footing. Separability (Crowhurst 1996) and Sympathy (de Lacy 1998) accounts are just two examples each of which has its deficits. The former decomposes footing into two separate processes of syllable parsing and head assignment, while the latter extends Sympathy Theory allowing markedness constraints as selectors (Al-Mohanna 2007).

Building on the work of Al-Mohanna (2007) on Cairene Arabic, the present study considers stress assignment in Jordanian Arabic (JA) discussed in Alghazo (1987), Al-Sughayer (1990), and Abu-Abbas (2003).

In the language, stress falls on the rightmost heavy syllable provided it is not beyond the antepenultimate, otherwise on the antepenultimate syllable.

Cross linguistically, there are two major factors that affect stress assignment processes. The first concerns the location of the stressed syllable within the word. Languages tend to designate an edgemost syllable, a leftmost (LM) or rightmost (RM), as the bearer of stress. Or at least, the stress-bearing syllable is calculated with reference to these edgemost syllables. The second factor is syllable weight. Heavy syllables have priority over light syllables when it comes to stress assignment. In the presence of more than one heavy syllable within a word, the edgemost factor comes into play, assuming that a language allows only one stress per word.

In metrical phonology, generalizations about stress are explained in terms of a metrical grid (Lieberman 1975; Prince 1983), or a metrical foot (Halle & Vergnaud 1987). In OT grammar, stress assignment is determined by two basic constraints introduced in (1) and (2) below from Prince and Smolensky (1993):

(1) Weight-to-Stress Principle (WSP)

Heavy syllables are stressed.

(2) EDGEMOST (PK; L/R; Word)

A peak of prominence lies at the L/R edge of the word.

The main function of WSP is to avoid footing a sequence of a light (L) and a heavy (H) syllable as ('LH),¹ since in such a foot, the heavy syllable is not prominent, i.e., it is not the head. Equally sub optimal, as far as (1) is concerned, is footing HLL as H('LL), since the heavy syllable is in non-head position.² The EDGEMOST constraint in (2) provides a gradient evaluation of outputs: the closer the candidate is to the designated edge the more harmonic it is with (2).

¹ Stressed syllables are marked by a (') before the syllable.

² WSP is violated here only when a light syllable is stressed in the presence of a heavy syllable.

The most familiar and simplest foot types are Trochaic and Iambic feet. They involve alternations between accented and unaccented syllables; syllables are thus grouped into pairs, and therefore form Binary Feet. Trochaic and iambic feet differ in their prominence patterns. In trochaic feet, the first syllable is more prominent than the second, while in iambic feet the opposite relation holds (Ewen & Hulst 2001). The interaction between WSP and EDGEMOST (PK; L/R; Word) is illustrated below in tableaux (3–5). A trochaic right-oriented system is considered where the requirement of these constraints is to stress the rightmost heavy syllable if the string contains one. We assume that the language allows a single stressed syllable per word. Accordingly, a hypothetical HHLL string will be stressed as H('HL)L, ruling out *('H)HLL and *HH('LL) as shown in (3) where (#) marks word boundary.

(3)

Input: HHLL	WSP	EDGEMOST (PK; R; Word).
a. σ H('HL)L		$\sigma\sigma \#$
b. ('H)HLL		$\sigma\sigma\sigma! \#$
c. HH('LL)	*!	$\sigma \#$

Candidate (3a) wins over its closest rival (3b) by being more harmonic as to the dictates of EDGEMOST (PK; R; Word). In both candidates, a heavy syllable is prominent within the foot. Although (3c) is more harmonic with EDGEMOST (PK; R; Word) than the actual output, it violates WSP and thus loses to the actual output. This suggests that WSP crucially dominates EDGEMOST (PK; R; Word). Note that candidates (3a) and (3b) both violate WSP once and candidate (3c) violates it twice. Crossing out violation marks will leave us with one violation of WSP incurred by (3c). We will be following this strategy in the remainder of this study when counting violation marks of WSP. The stressed heavy syllable in (3a) is closer to the right edge of the word compared to the stressed heavy syllable in (3b). As mentioned earlier, EDGEMOST (PK; R; Word) is a gradient constraint. The heavy stressed syllable in (3a) is separated from the right edge of the word by two syllables, while in its rival (3b) the stressed heavy syllable is separated from the right edge of the word by three syllables. Candidate (3c)

is ruled out since neither of the heavy syllables receives stress and thus the crucial domination of WSP over EDGEMOST (PK; R; Word).

Within a hypothetical LLHH string, stress will fall on the final heavy syllable according to the two ranked constraints established so far. The final two syllables are equivalent in weight allowing EDGEMOST (PK; R; Word) to optimize (4a) as shown in (4):

(4)

Input: LLHH	WSP	EDGEMOST (PK; R; Word).
a. σ LLH('H)		
b. LL ('H)H		$\sigma!$ #
c. L('LH)H	*!	$\sigma\sigma$ #

Candidate (4a) wins over its closest rival by satisfying the dictates of EDGEMOST (PK; R; Word). The prominent heavy syllable in (4a) is rightmost in the word, whereas it is separated by a syllable in (4b). Candidate (4c) is excluded due to a fatal violation of the higher ranked WSP.

In the absence of heavy syllables from a string of syllables, stress is determined by the edgemost constraint alone. Tableau (5) illustrates stress assignment in the hypothetical string LLLL.

(5)

Input: LLLL	WSP	EDGEMOST (PK; R; Word).
a. σ LL('LL)		σ #
b. L('LL)L		$\sigma\sigma!$ #
c. ('LL)LL		$\sigma\sigma!$ σ #

In tableau (5), WSP is vacuously satisfied by all three candidates since a heavy syllable does not exist. Determining the optimal output falls on the shoulders of EDGEMOST (PK; R; Word) which favors candidate (5a) since the stress bearing syllable is separated from the right edge of the word by a

single syllable. Candidate (5b) has a stressed syllable that is separated from the right edge by two syllables, and finally the stressed syllable in (5c) is separated from the right edge of the word by three syllables.

2. Stress-Assignment Principles in JA

Syllable quantity plays a major role in stress assignment in all Arabic dialects including JA. Stress is assigned to the rightmost heavy syllable provided that it is not separated from the right edge of the word by more than two syllables, i.e., pre-antepenultimate syllables are never stressed in JA. In the absence of a heavy syllable under the condition above i.e. in the ultimate or penultimate syllable, the antepenultimate syllable is stressed. Word-final CVC syllables are considered light and never attract stress. This is due to the extrametricality of the final consonant as shown in the discussion below. Data in (6) include various possible structures in JA starting from disyllabic words³ all the way to words with five syllables.⁴

(6)

a.	<u>Disyllabic words</u>	<u>Gloss</u>
	<i>'da.wa</i>	'medicine'
	<i>ma.'ħ⁵all</i>	'a store'
	<i>'fi.him</i>	'he understood'
	<i>da.'maar</i>	'destruction'
	<i>mis.'maar</i>	'a nail'
	<i>qaa.'nuun</i>	'a law'

³ Content words in JA are minimally bimoraic. A single heavy syllable or two light syllables are minimally required to form a content word in the language.

⁴ A detailed morpheme by morpheme analysis of these examples is irrelevant to the main goals of this paper and requires a daunting description of Arabic morphology.

⁵ /ħ/ symbolizes a voiceless pharyngeal fricative.

b. Trisyllabic words

<i>'ba.ra.k-a</i>	‘a blessing-fem.’
<i>ba.ra.'ka-at</i>	‘blessings’
<i>ma.'ħaa.kim</i>	‘courts’
<i>fi.'him.na</i>	‘he understood us’
<i>xaa.'tim.hum</i>	‘their ring’
<i>'msaa.wa.mah</i>	‘bargaining’
<i>mir.tab.'kiin</i>	‘confused’
<i>'muħ.ta.ram</i>	‘respectable’
<i>'mak.ta.bi</i>	‘my office’

c. Words with more than three syllables Gloss

<i>mis.ta⁶.'ma.ra.ti</i>	‘my colony’
<i>miz.'ra.ħa.tu</i>	‘his farm’
<i>miz.ra.'ħat.hum</i>	‘their farm’
<i>miš.ta.ra.'jaat</i>	‘purchases’
<i>muħ.'ta.ra.ma</i>	‘respectable (fem.)’

Data in (6) confirm the stress assignment rules in JA. A pre-antepenultimate syllable is never stressed. This leaves the last three syllables from the right edge as stress bearers in the language. The rightmost heavy syllable is stressed, and if one is not found among the final

⁶ (ʕ) symbolizes a voiced pharyngeal fricative.

three syllables of the word, then the antepenultimate syllable receives stress.⁷

2.1 The basic constraints

McCarthy (1979a, b) argues that feet are bounded in size in terms of the moras they have, rather than by the number of syllables a foot has. A foot according to McCarthy is made up of mora of the stressed syllable and at most two following moras. This in effect allows binary feet to consist of two light syllables, one heavy syllable, or a heavy and light syllable. Thus feet are minimally bimoraic and maximally trimoraic. Foot binarity is expressed through the OT constraint FOOT BINARITY, introduced in (7). In JA, a dialect that does not allow unbounded feet, this constraint is ranked very high in the grammar.

(7) FOOT BINARITY (FTBIN)

Feet are binary at some level of analysis (μ , σ)⁸

According to (7), a trisyllabic word is parsed as $(\sigma\sigma)\sigma$ or $\sigma(\sigma\sigma)$, and a trimoraic word is parsed as $(\mu\mu)\mu$ or $\mu(\mu\mu)$.⁹ Favoring $\sigma(\sigma\sigma)$ over $(\sigma\sigma)\sigma$ or $\mu(\mu\mu)$ over $(\mu\mu)\mu$ is determined by a high ranked EDGEMOST (PK; R; Word). On the other hand, favoring $(\sigma\sigma)\sigma$ over $\sigma(\sigma\sigma)$, or $(\mu\mu)\mu$ over $\mu(\mu\mu)$ is the function of a high ranked NONFINALITY(NF) constraint that bans the head of a prosodic word from appearing at the end of the word. This constraint is formulated in (8) from Prince and Smolensky (1993):

(8) NONFINALITY

No head of Prosodic Word is final in Prosodic Word.

⁷ A single foot per word is erected and thus only primary stress is marked. No evidence for secondary stress in JA is available. An argument for the mono-foot construction is discussed below.

⁸ Feet are placed within parentheses.

⁹ Tri-moraic feet are also permissible. A heavy syllable may be followed by a light syllable to form a binary foot at the syllable level as in (15a).

The word ‘head’ here is used to refer to the stressed syllable within the foot or the stressed foot within the word. Feet in JA are trochaic. This means that within the foot, the stressed syllable precedes the unstressed syllable. Feet are however assigned at the right edge of the word. Heavy syllables are prominent within the foot since they attract stress. This fact is a function of WSP introduced earlier in (1) and repeated in (9) for convenience:

(9) Weight-to-Stress Principle (WSP)

Heavy syllables are stressed.

This constraint is responsible for ruling out trochees with the structure ('LH) because the heavy syllable is parsed in a dependent position.¹⁰

The interaction of the constraints introduced so far accounts for most of the stress patterns in the data in (6). Additional constraints will be introduced throughout the discussion. For the purposes of the NF constraint, a head foot and head syllable will be represented as 'F and 'σ respectively. Tableau (10) provides an account of the stress pattern of a disyllabic LH word like /da.'maar/ ‘destruction’:

(10)

Input: damaar	FTBIN	WSP	NF
a. $\text{da}'\text{maar}$			*'F and *'σ
b. ('da.maar)		*!	*'F
c. ('da)maar	*!	*	

The optimal candidate is (10a) which contains a stressed heavy syllable in concord with WSP and FTBIN since the syllable is bimoraic. Its poor performance on NF is irrelevant given the constraint ranking in the tableau. Candidates (10b) and (10c) are ruled out by the dictates of WSP and FTBIN respectively.

¹⁰ ('LH) trochees are allowed in JA only when the heavy syllable has an epenthetic vowel. See Abu-Abbas (2003) for details.

In words with three heavy syllables HHH, as in /mir.tab.'kiin/ ‘confused’, the rightmost heavy syllable will receive stress. This suggests that EDGEMOST ($'\sigma$; R; Word) must outrank NF($'F$, $'\sigma$), otherwise the penultimate syllable will receive stress as tableau (11) shows:

(11)

Input:/mirtabkiin/	FTBIN	WSP	EDGEMOST	NF
a. $\text{mir}(\text{tab})\text{'kiin}$				*'F *'σ
b. $\text{mir}(\text{'tab})\text{kiin}$			σ!#	
c. $(\text{'mir})\text{tab.kiin}$			σ!σ #	

The three candidates in (11) all have binary feet and heavy stressed syllables thus obeying FTBIN and WSP. Choosing (11a) as the optimal output is a function of EDGEMOST since this is the only candidate with a final stressed syllable.

The analysis of LHL forms as in /fi.'him.na/ ‘he understood us’ requires a crucial domination of WSP over EDGEMOST as tableau (12) exemplifies:

(12)

Input:/fi.him.na/	FTBIN	WSP	EDGEMOST	NF
a. $\text{fi}(\text{'him.na})$			σ #	*'F
b. $\text{fi}(\text{him.'na})$		*!		*'F *'σ
c. fi.him.('na)	*!	*		*'F *'σ

Candidate (12a) violates EDGEMOST, since the stressed syllable is removed from the edge of the word. The other two candidates do not violate this constraint because the stressed syllable is final in the word. Nevertheless, these two candidates fail to surface since both have a light syllable as the primary stress bearer in violation of WSP, and (12c) incurs an extra violation by having a monosyllabic, monomoraic foot in violation of FTBIN. The domination of WSP over EDGEMOST is crucial, since reversing the order

will produce (12b) as the optimal output.¹¹ However, a potential candidate like fi('him)na is more harmonic to the hierarchy established thus far since it fares better as to the requirements of NF.

In JA, a single stressed syllable per word is proposed. The only place in the literature where secondary stress has been considered is Hayes (1995). Otherwise, Kenstowicz (1981), Kenstowicz and Abdul-Karim (1980), Abu-Salim (1987) all do not recognize secondary stress in any Arabic variety. To account for the single stress per word in Cairene Arabic (CA), Al-Mohanna (2007) proposes an interaction of a constraint that requires parsing syllables into feet PARSE-SYL (McCarthy and Prince 1993b) with $Lx \approx PR$ (Prince & Smolensky 1993/2002) and *FT (de Lacy 1998). The requirements of $Lx \approx PR$ and *FT are contradictory. While the former obligates a minimum of prosodic configuration to license lexical representation, the latter militates against any form of structuring (Al-Mohanna 2007: 9). The hierarchy in (13) guarantees the erection of a single foot in a word as shown in (14).

(13) $Lx \approx PR \gg *FT \gg PARSE-SYL$

(14)

	$Lx \approx PR$	*FT	PARSE-SYL
a. $\sigma\sigma(' \sigma\sigma)$		*	**
b. $(' \sigma\sigma)(' \sigma\sigma)$		**!	
c. <xxxx>	*!		****

Candidate (14c) is ruled out by the high ranked $Lx \approx PR$ since it does not have any structure. On the other hand, (14b) is less harmonic than (14a) since it is fully parsed incurring two violations of *FT compared to a single violation by (14a).

Ranking PARSE-SYL higher than NF favors fi('him.na) over fi('him)na as shown in (15).

¹¹ Failure of (12b) can be attributed to the fact that feet in JA are trochaic. Nevertheless, the hierarchy is still valid to account for structures like that in (22).

(15)

Input:/fi.him.na/	L _x ≈PR	*FT	PARSE-SYL	NF
a. σ fi('him.na)		*	*	*F
b. fi('him)na		*	***!	

Candidate (15a) is optimal since only one syllable is not parsed compared to two syllables in (15b).

Other LHL might have a CVC final syllable as in /ma.'haa.kim/ 'courts'. In such examples, final CVC syllables are considered light and never attract stress. This is due to the extrametricality of the final consonant. The notion of extrametricality is avoided in OT. Its effect may be achieved by a constraint that bans the association of a mora to the coda consonant of a final syllable. This constraint will ban the structure CV μ C μ]σ. This constraint is introduced in (16):

(16) *FinalC μ

A syllable-final consonant in a final syllable cannot be moraic.

This constraint will necessarily be ranked over a faithfulness constraint that seeks to preserve input moras in the output. This constraint is introduced in (17) from Prince and Smolensky (1993):

(17) MAX-IO(μ)

An underlying mora must be attached to syllable structure.

The interaction of the constraint to derive the stress pattern in /ma.'haa.kim/ is exemplified in (18):

(18)

Input: mahaakim	FTBIN	*FinalC μ] σ	MAX-IO(μ)	WSP	EDGEMOST	NF
a. $\text{ma.}^{\text{h}}\text{aa.kim}$			*		$\sigma \#$	*F
b. $\text{ma.haa}^{\text{h}}\text{ki}\mu\text{m}\mu$		*!				*F* σ

Both candidates satisfy FTBIN: candidate (18a) has a disyllabic foot and (18b) has a bimoraic foot. (18a) wins the competition since it satisfies the higher ranked *FinalC μ] σ . From now on in the discussion, final CVC syllables will be treated as light syllables without reference to the constraints responsible. The constraints will be referred to only when their presence is crucial to the discussion.

The treatment of HHL forms in words such as /xaa.'tim.hum/ 'their ring' follows from the domination of WSP over EDGEMOST, as tableau (19) shows:

(19)

Input: xaatimhum	FTBIN	WSP	EDGEMOST	NF
a. $\text{xaa}^{\text{h}}\text{tim.hum}$			$\sigma \#$	*F
b. $(\text{xaa})\text{tim.hum}$			$\sigma\sigma! \#$	
c. $\text{xaa}(\text{tim.})\text{hum}$		*!		*F* σ

The optimal candidate is (19a). Its closest rival is (19b). Both candidates satisfy the high ranking FTBIN and WSP. Candidate (19a) wins the competition due to the dictates of EDGEMOST. The stressed syllable in (19a) is separated from the edge of the word by only one syllable while (19b) is separated from the edge of the word by two syllables and is thus excluded from the competition. Candidate (19c) is out of the game due to a fatal violation of the higher ranked WSP since stress falls on a light syllable.

Going back to disyllabic words that comprise two light syllables LL such as /fihim/ 'he understood'. Such forms have stress on the initial syllable in violation of EDGEMOST. This example has the output form as ('fi.him) which violates EDGEMOST by having a syllable between the initial stressed syllable and the right edge of the word. We already know that a

hypothetical output like fi('him) is ruled out by the constraint against monosyllabic or monomoraic feet, namely FTBIN. The problem is in a hypothetical output of the form (fi.'him), which satisfies FTBIN and should be selected over ('fi.him) by the dictates of EDGEMOST. This hypothetical output has stress on the right edge of the word. We have mentioned earlier that prosodic feet in JA are trochaic, and it is this constraint on foot form that rules (fi.'him) out and selects ('fi.him) instead. The ‘trochaic feet’ constraint is formulated in (20), and its power to choose ('fi.him) over (fi.'him) is exemplified in (21).

(20) RH-TYPE= T

Feet in JA have initial prominence

(21)

Input: fihim	RH-TYPE= T	FTBIN	WSP	EDGEMOST	NF
a. σ ('fi.him)				$\sigma \#$	*'F
b. (fi.'him)	*!				*'F *'σ
c. fi('him)		*!			

According to (21), candidate (21a) wins over (21b) since the latter has an iambic foot rather than a trochaic foot. RH-TYPE= T will not be invoked unless crucial to the discussion. It will be taken to hold for all analyses. WSP is vacuously satisfied by both constraints since none of them has a heavy syllable to be evaluated for stress assignment.

As with other forms with a heavy syllable, the analysis of HLL forms as in /'mak.ta.bi/ ‘my office’ follows from the high ranking of WSP which necessarily dominates EDGEMOST and NF as tableau (22) shows:

(22)

Input: maktabi	FTBIN	WSP	EDGEMOST	NF
a. σ ('mak.ta)bi			$\sigma \sigma \#$	
b. mak ('ta.bi)		*!	$\sigma \#$	*'F

Candidate (22a) surfaces as the optimal output since it complies with the higher ranked WSP, which is violated by (22b). A candidate like /('mak)(ta.bi)/ is ruled out by the hierarchy in (13). Note that in (22a), the stressed foot is disyllabic but tri-moraic. A potential candidate like /('mak)ta bi/ which is as harmonic as (22a) to the constraint hierarchy established so far is nevertheless ruled out by the requirements of PARSE-SYL or by a LAPSE constraint discussed in section 2.3.

2.2 Splitting EDGEMOST

Trisyllabic forms LLL like /'ba.ra.ka/ ‘a blessing’ prove problematic given the ranking of constraints established so far. In order to allow a rightmost heavy syllable in a form like HHH to receive stress in JA, it was imperative for EDGEMOST to be ranked higher than NF, as was shown in (11) above. Given these facts, it would be impossible to account for the antepenultimate stress in forms like 'LLL since such forms require NF to be ranked higher than EDGEMOST. Tableau (23) clarifies the argument:

(23)

Input: baraka	FTBIN	WSP	EDGEMOST	NF
a. ☹('ba.ra)ka			σσ! #	
b. ☺ba('ra.ka)			σ #	*'F

According to (23), candidate (23b) will surface as the optimal output. This is incorrect conclusion since the actual surface form is (23a) marked here with the sad face. The problem could be solved by reversing the order of EDGEMOST and NF. As mentioned earlier, the constraint ranking in (23) is imperative in order to derive correct stress patterns in forms like HHH.

To solve the ranking paradox encountered above, we propose separate EDGEMOST constraints for heavy and light syllables. A constraint demanding heavy stressed syllables to be rightmost in a word will have to dominate NF, while a constraint that requires light stressed syllables to be rightmost in a word will have to be dominated by NF. This might be a justifiable split of EDGEMOST since Arabic is a weight-sensitive language and it should be reasonable for the language to make direct reference to heavy syllables.

Accordingly, EDGEMOST will be treated as a family of constraints that includes (24) and (25) below:

(24) EDGEMOST ('H; R; Word)

A stressed heavy syllable lies at the right edge of a word.

(25) EDGEMOST ('L; R; Word)

A stressed light syllable lies at the right edge of a word.

The dominance relationship between (24) and (25) on the one hand and NF on the other is expressed in (26):

(26) EDGEMOST ('H; R; Word) >> NF >> EDGEMOST ('L; R; Word)¹²

The interaction of the constraints in (26) deriving stress patterns in HHH and LLL forms is expressed in (27) and (28) respectively:

(27)

Input: mirtabkiin	EDGEMOST('H;R;Word)	NF	EDGEMOST('L;R;Word)
a. σ mir.tab('kiin)		*'F *'σ	
b. mir('tab)kiin	σ! #		
c. ('mir)tab.kiin	σ! σ #		

In (27), candidate (27a) surfaces as the optimal output since it has a stressed heavy syllable at the right edge of the word. Its poor performance on NF is irrelevant given that the other two candidates violate a higher ranked constraint. EDGEMOST ('L; R; Word) is vacuously satisfied by all candidates since none of them has a light stressed syllable to be evaluated by this constraint.

¹² EDGEMOST ('H; R; Word) is ranked higher than EDGEMOST ('H; L; Word) since the language is right-side oriented.

(28)

Input: baraka	EDGEMOST('H;R;Word)	NF	EDGEMOST('L;R;Word)
a. σ ('ba.ra)ka			$\sigma \sigma \#$
b. ba ('ra.ka)		*'F!	$\sigma \#$

In (28), candidate (28a) surfaces as the optimal output since its competitor violates a higher ranked constraint. Both candidates vacuously satisfy EDGEMOST ('H; R; Word) since neither has a heavy syllable to be evaluated by this constraint. The merit of splitting the edgemost constraint into two separate constraints is evident in tableau (28).

2.3 Words with more than three syllables

In JA, a word may consist of up to five syllables. We will first take a look at words with the structure HLLL such as / muħ.'ta.ra.ma/ 'respectable (fem.)'. The antepenultimate syllable receives stress in violation of WSP, which would have assigned stress to the first heavy syllable. The constraint ranking introduced so far fails to produce the actual stress pattern in this and similar examples. According to WSP, the structure HLLL should be parsed as ('HL)LL. What we need then is a constraint that would rule such parsing. We have previously mentioned that stress in JA may not be assigned to any pre-antepenultimate syllable. This constraint comes in violation of WSP which implies that whatever the constraint responsible for ruling out ('HL)LL, it must be ranked over WSP. The constraint we are looking for to account for the apparent paradox encountered above was introduced by Selkirk (1984a) as *Lapse* and by Hayes (1995) as *Persistent Footing*. These terms were then discussed by Green and Kenstowicz (1995) and introduced as the constraint LAPSE.

(29) LAPSE

Two successive unparsed syllables are disfavored.

Kager (1994, 1996) further elaborates on this notion and introduces PARSE-2 as a constraint that avoids adjacent unparsed stress units in a word where

multiple feet are erected. Al-Mohanna (1998) divides PARSE-2 into two constraints, namely PARSE-2(I/F) defined in (30) and (31) respectively.

(30) PARSE-2-I

Parsable stress units in **initial** sequences should be parsed by a foot.

(31) PARSE-2-F

Parsable stress units in **final** sequences should be parsed by a foot.

The function of PARSE-2-I is to disallow successive unparsed syllables at the left edge of a word, while PARSE-2-F disallows successive unparsed syllables at the right edge of a word.

The active constraint in JA is PARSE-2-F. In essence, this constraint bans the structure ('σσ)σσ since the last two syllables are unparsed by foot boundary. The effect of this constraint is exemplified in (32):

(32)

Input: muḥtarama	PARSE-2-F	WSP	NF	EDGEMOST('L;R; Word)
a. $\text{muḥ}^{\text{H}}(\text{tara})\text{ma}$		*		σ σ #
b. ('muḥ.ta)rama	*!			
c. muḥ.ta('ra.ma)		*	*'F!	σ #

The optimal candidate is (32a) which wins over its two rivals despite the fact that it violates WSP. The determining factor turns out to be PARSE-2-F which is violated by candidate (32b) while (32c) violates NF.

The constraint ranking so far is sufficient to derive correct stress patterns in words with five syllables such as the form HHL LL in a word like /mis.taʃ.'ma.ra.ti/ 'my colony' as shown in (33):

(33)

Input: mistaʃmarati	PARSE-2-F	WSP	EDGEMOST('H; R; Word)	NF	EDGEMOST('L; R; Word)
a. mis.taʃ('ma.ra)ti		*			$\sigma\sigma \#$
b. $\text{mis.taʃ.ma('ra.ti)}$		*		*F!	$\sigma \#$

The optimal candidate is (33a) which is identical to (33b) in satisfying higher ranked PARSE-2-F and violating WSP. (33a) wins the competition on the NF constraint which is violated by (33b). A candidate like / mis. ('taʃ.ma).ra.ti/ is ruled out by the higher ranked PARSE-2-F.

2.4 Default-to-the-Opposite-Side stress pattern

Kenstowicz (1994), Hayes (1995), and Walker (1996) discuss DOS stress patterns and conclude that a total of eleven languages feature this stress pattern. In nine of these languages, the default side for stress in words consisting of only light syllables is the left side while in the other two languages; the default side is the right side.¹³ In an attempt to re-analyze DOS stress patterns, Gordon (2000: 103) notes that certain DOS languages place secondary stress on heavy syllables not receiving primary stress, (Prince 1983; Hayes 1995; Bakovic 1998). In other languages, the default stress pattern is better analyzed as intonational prominence rather than stress. Finally, there is a small set of languages including Arabic for which stress data is either incomplete or conflicted and neither clearly fits the default-to-opposite pattern nor is clearly amenable to re-analysis in terms similar to those relevant for other default-to-opposite stress systems.

Classical Arabic is a very familiar case of DOS stress pattern (McCarthy 1979a). His analysis is rather controversial (Abdo 1969; Al-Sughayer 1990;¹⁴ Angoujard 1990). Accordingly, Arabic varieties have never been categorized as DOS or DSS systems.

¹³ For a detailed account of these languages, consult Gordon (2000)

¹⁴ Abdo (1969) and Al-Sughayer (1990) argue that in words with only light syllables, stress falls on the ante-penultimate syllable.

My attempt to categorize JA¹⁵ is based on an analysis of the interaction between EDGEMOST and NONFINALITY in the language. When higher ranked constraints are equally satisfied or violated, violating NF by having a stressed heavy syllable in final position is tolerated while having a final stressed foot made up of two light syllables is not. Accordingly, EDGEMOST was split into two constraints; one demanding heavy stressed syllables to be rightmost in a word and the other demanding light stressed syllables to be rightmost. The first dominates NF while the second is dominated by it. In the language as well, PARSE is also edge oriented. Two unparsed syllables at the right edge of a word are not tolerated while permitted at the left edge of a word and thus PARSE-2-F was introduced. Both EDGEMOST constraints refer to the right edge of a word and so does PARSE-2-F. The language prefers stressing the rightmost heavy syllable; thus EDGEMOST ('H; R; Word) is ranked higher than NF. PARSE-2-F is ranked higher than WSP and EDGEMOST ('H; R; Word). The constraint hierarchy responsible for stress assignment in JA is introduced in (34).

(34) Stress in JA

FTBIN , PARSE-2-F >> WSP >> EDGEMOST ('H; R; Word) >> PARSE-SYL

NF >> EDGEMOST('L;R; Word)

The language prefers placing stressed syllables as close to the right edge as possible regardless of their weight. Higher ranked PARSE-2-F together with FTBIN force stress to occur on a light antepenultimate syllable in H('LL)L structures since ('HL)LL and ('H)LLL violate PARSE-2-F, HL('LL) satisfies PARSE-2-F and fares as well as the optimal candidate as to WSP but violates NF. In words with no heavy syllables, PARSE-2-F and NF force stress to occur on the antepenultimate syllable as in L('LL)L since ('LL)LL violates PARSE-2-F, ('LLL)L violates FTBIN, and LL('LL) violates NF which is satisfied by the optimal candidate. A closer look at the constraint interaction in the language reveals that EDGEMOST ('L; R; Word) is never responsible for optimizing a candidate and is thus ranked very low in the

¹⁵ I believe the argument may be extended to many varieties of Arabic including Classical Arabic. This is an endeavor that will not be undertaken in the present study.

hierarchy. In the absence of a stressable heavy syllable, the higher ranked constraints will optimize the correct candidate without ever being evaluated by EDGEMOST ('L; R; Word). Thus categorizing JA or any other language for that matter as having a Default-to-the-Opposite-Side (DOS) stress pattern must entail that a constraint demanding stressed light syllables to be leftmost in a word, i.e. EDGEMOST ('L; L; Word) should be ranked higher than a constraint demanding such syllables to be rightmost in a word i.e., EDGEMOST ('L; R; Word) (section 3). This is not the case in JA. Accordingly, we propose categorizing JA and similar languages as employing a Default-to-the-Same-Side (DSS) stress pattern based on the fact that heavy syllables target the right edge of the word.

3. EDGEMOST and the typology of weight-(in)sensitive languages

Treatment of EDGEMOST as a weight sensitive constraint produces four competing constraints (35). This results in twenty four possible rankings (36) producing four distinct weight-sensitive stress systems (37) all of which are typologically attested (Hayes 1995).¹⁶

(35) EDGEMOST

- a. EDGEMOST ('L; L; Word) LM('L)
A stressed light syllable lies at the left edge of a word.
- b. EDGEMOST ('L; R; Word) RM('L)
A stressed light syllable lies at the right edge of a word.
- c. EDGEMOST ('H; L; Word) LM('H)
A stressed heavy syllable lies at the left edge of a word.
- d. EDGEMOST ('H; R; Word) RM('H)
A stressed heavy syllable lies at the right edge of a word.

¹⁶ All examples used in this section are cited in Hayes (1995) unless otherwise stated.

(36) Interaction of EDGEMOST constraints

<u>Hierarchy</u>	<u>EDGEMOST</u>	<u>Default</u>
1. RM('H)>> RM('L) >> LM('H) >> LM('L)	Right	Same side
2. RM('H)>> RM('L) >> LM('L) >> LM('H)	Right	Same side
3. RM('H)>> LM('H) >> RM('L) >> LM('L)	Right	Same side
4. RM('H)>> LM('H) >> LM('L) >> RM('L)	Right	Opposite side
5. RM('H)>> LM('L) >> RM('L) >> LM('H)	Right	Opposite side
6. RM('H)>> LM('L) >> LM('H) >> RM('L)	Right	Opposite side
7. RM('L)>> RM('H) >> LM('H) >> LM('L)	Right	Same side
8. RM('L)>> RM('H) >> LM('L) >> LM('H)	Right	Same side
9. RM('L)>> LM('L) >> RM('H) >> LM('H)	Right	Same side
10. LM('L)>> RM('H) >> LM('H) >> RM('L)	Right	Opposite side
11. LM('L)>> RM('H) >> RM('L) >> LM('H)	Right	Opposite side
12. LM('L)>> RM('L) >> RM('H) >> LM('H)	Right	Opposite side
13. LM('H)>> LM('L) >> RM('H) >> RM('L)	Left	Same side
14. LM('H)>> LM('L) >> RM('L) >> RM('H)	Left	Same side
15. LM('H)>> RM('H) >> LM('L) >> RM('L)	Left	Same side
16. LM('H)>> RM('H) >> RM('L) >> LM('L)	Left	Opposite side
17. LM('H)>> RM('L) >> RM('H) >> LM('L)	Left	Opposite side
18. LM('H)>> RM('L) >> LM('L) >> RM('H)	Left	Opposite side
19. LM('L)>> RM('L) >> LM('H) >> RM('H)	Left	Same side
20. LM('L)>> LM('H) >> RM('H) >> RM('L)	Left	Same side
21. LM('L)>> LM('H) >> RM('L) >> RM('H)	Left	Same side
22. RM('L)>> LM('L) >> LM('H) >> RM('H)	Left	Opposite side
23. RM('L)>> LM('H) >> RM('H) >> LM('L)	Left	Opposite side
24. RM('L)>> LM('H) >> LM('L) >> RM('H)	Left	Opposite side

(37) Four weight-sensitive stress patterns

- a. Right-side with default to the same side (Aguacatec and Western Cheremis)
- b. Right side with default to the opposite side (Chuvash, Huasteco, and Selkup)
- c. Left side with default to the same side (Amele, Sanskrit, and Russian)
- d. Left side with default to the opposite side (Komi and Kwakiutl)

In order to determine the type of weight-sensitive stress pattern of a particular language, the hierarchies in (38) and (39) are proposed to account for right side and left side languages respectively.

(38) Right side languages

$$\text{RM('H)} \gg \text{LM('H)}$$

(39) Left side languages

$$\text{LM('H)} \gg \text{RM('H)}$$

The relative ranking of RM('L) and LM('L) is irrelevant in determining edge orientation of a heavy stressed syllable. However, these two constraints are responsible for identifying the location of default stress. Accordingly, Default-to-the-Same-Side (DSS) stress languages must involve the sub-hierarchies in (40) and (41) for rightmost and leftmost languages respectively while Default-to-the-Opposite-Side (DOS) languages involve the sub-hierarchies in (42) and (43) for rightmost and leftmost languages respectively.

(40) Stress the rightmost heavy syllables, otherwise stress the rightmost syllable

$$\text{RM('H)} \gg \text{LM('H)} \text{ and}$$

$$\text{RM('L)} \gg \text{LM('L)}$$

(41) Stress the leftmost heavy syllable, otherwise stress the leftmost syllable

LM('H) >> RM('H) and

LM('L) >> RM('L)

(42) Stress the rightmost heavy syllable, otherwise stress the leftmost syllable

RM('H) >> LM('H) and

LM('L) >> RM('L)

(43) Stress the leftmost heavy syllable, otherwise stress the rightmost syllable

LM('H) >> RM('H)

RM('L) >> LM('L)

The hierarchies in (40–43) represent what may be termed picture-perfect DSS or DOS stress systems which implies that these hierarchies are ranked very high in the language in question.¹⁷

In JA, RM('H) is ranked higher than LM('H) (26) which indicates that the language is right-side oriented (38). However, the relative ranking of LM('L) and RM('L) could not be determined and thus categorizing the language as DSS or DOS based on (40) or (42) is not possible. This leaves us with two options. Categorizing JA as a weight-sensitive language without a specified default stress position or as a DSS language, based on the fact that heavy syllables target the right side and so does PARSE-2-F.

Weight-insensitivity on the other hand is a result of ranking WSP lower than all EDGEMOST constraints if both rightmost constraints are ranked higher than both leftmost constraints (44) or vice versa (45) to produce rightmost and leftmost languages respectively.

¹⁷ WSP is ranked higher because these are weight-sensitive languages.

(44) Weight-insensitive rightmost systems Uzbek (Walker 1996)

RM('H), RM('L) >> LM('H), LM('L), WSP

(45) Weight-insensitive leftmost systems Tinrin (Walker 1996)

LM('H), LM('L) >> RM('H), RM('L), WSP

Ranking NF higher than the constraints in (44) produces penultimate stress while ranking PARSE-2-F higher produces antepenultimate stress.

Finally, the notion of weight-sensitive EDGEMOST helps in accounting for a wide variety of stress systems. The validity of the sub-hierarchies in (40–43) for the categorization of DSS and DOS stress systems is an endeavor that will be left for further research.

4. Conclusion

Facts in JA show that arguing for a weight-sensitive EDGEMOST constraint is empirically justified and may be extended to account for stress patterns in a variety of languages providing additional typological support for the constraint. The proposal provides a straightforward account of various attested stress patterns. Weight-insensitivity is directly related to one of the hierarchies introduced earlier in (44) and (45) while weight-sensitivity is accounted for by the high ranking of WSP. Default stress position is accounted for by the ranking of RM('L) and LM('L) relative to each other and to other stress-related constraints. Of particular importance is the fact that DSS stress systems must involve the sub-hierarchies in (40) and (41) while DOS systems must involve the sub-hierarchies in (42) and (43). According to these hierarchies, stress systems are categorized. In JA, none of the hierarchies above was fully established. The language is categorized as having a DSS stress system based on the fact that heavy stressed syllables target the right edge of a word and PARSE-2-F makes reference to the right edge of the word as well.

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