Serial Feet Construction in Cairene MSA:

A Harmonic Serial Account

By: Waleed Noaman Al-Oshari
Assistant Professor, Taiz University
Email:rashadco2001@yahoo.com

By: Tawfeek Mohammed Al-Shar'abi
Assistant Professor, Thamar University Email:
Email: tawmhd@yahoo.com

Abstract

In this study, we attempt to formulate a constraint-based account of stress in Cairene Modern Standard Arabic (MSA), within the Harmonic Serialism framework (HS). The study demonstrates that metrical foot construction in Cairene MSA falls in line with the main tenets of HS. No secondary stresses are attested in Cairene MSA, mainly because building more feet does not improve harmony. The constraint hierarchy which we developed accounts for all the stress patterns of this variety of MSA. The interaction between key constraints, namely NON-FINALITY, RIGHTMOST, and ALIGN-LIGHTSTRAY(R) takes care of attaining the correct stress placement in this variety of Arabic. FT-BIN$_{\mu}$ is ranked below in the hierarchy since degenerate feet are allowed to surface in Cairene MSA carrying the main stress of the word. NON-FINALITY is ranked among the high ranked constraints since the head foot is never word-final in Cairene MSA. Superheavy syllables which are attested word finally in Cairene MSA are accounted for as well.

The study shows that a parallel evaluation of inputs is also possible in standard parallel Optimality Theory (OT). Both HS and parallel OT fare equally with regard to the absence of secondary stresses in Cairene MSA. The former justifies the absence of secondary stresses to the lack of harmonic improvement and the latter achieves the same as a result of the conflicting constraints.

The study includes six sections; the first section introduces the theoretical background. The section provides the constraints necessary to account for stress in Cairene MSA and the Harmonic Serial account is presented in the third section. Superheavy syllables in Cairene are dealt with in the fourth section. The parallel OT account is outlined in the fifth section. The sixth section provides the conclusion.

Key words: Optimality Theory, Harmonic Serialism, Feet construction, Cairene MSA, Stress

Introduction:

McCarthy (2008) and Pruitt (2008), present a variant of OT called HS that allows a type of serial derivation into OT. While HS shares the core assumptions of classical OT, the major characteristics of HS include Gradualness and Harmonic improvement. Gradualness in HS refers to the capacity of GEN to incur only one faithfulness violation at a time to the input. Hence, in the domain of metrical structure, gradualness suggests the construction of only one new foot at each derivational level. Harmonic improvement requires that each individual operation in a sequence helps improve harmony. So in every pass through GEN and EVAL, the candidate selected as optimal has to be more harmonic than or identical to the input. If it is more harmonic, then it qualifies to be the input of another pass through GEN and EVAL. If identical, then harmonic improvement fails and the derivation terminates, signaling convergence.

McCarthy (2008) uses HS to account for the effects of stress assignment and syncope. Pruitt (2008) makes use of HS to account for iterative foot construction in languages with multiple feet. We demonstrate in this paper that Harmonic Serialism could very well account for the stress system of Cairene MSA which admits only one stress per word. We argue that metrical structure of stress assignment in languages is built serially such that the overall metrical feet structure is the final stage and the result of harmonically improving consecutive application of foot construction. Secondary and tertiary stresses which result from building more than one foot per word do not surface in Cairene MSA, mainly because building more feet does not improve harmony. Hence, outputs surface with just one foot per word. Our proposed account fares better than other accounts that may resort to ad hoc structural erasing devices, such as conflation, Halle & Vergnaud (1987, pp. 52-55), as it also exhaustively capture all stress patterns of Cairene MSA.[1]

Stress in majority of Arabic dialects falls on the ultima, penult or antepenult. While Cairene MSA restricts stress to the last three syllables of the word, quantity sensitivity to stress is only attested in the superheavy ultimas and heavy penults. Contrary to quantity sensitive systems, heavy antepenults never attract stress in Cairene MSA. Moreover, degenerate feet are permitted in this variety of MSA to carry the main and only stress of the word.

Constraints in Cairene MSA:

In Cairene MSA, as in many other languages, there is a minimality requirement on what constitutes a possible lexical word. A mono-syllabic lexical word in Cairene MSA consists of at least one heavy syllable (i.e. $\sigma_{\mu\mu}$), but is never a light syllable. Moreover, every lexical word in Arabic must contain at least one foot.

Cairene MSA has been characterised as a quantity-sensitive trochaic stress system.[2] Superheavy syllables attested word-finally carry the main stress of the word in Cairene MSA. In the absence of such syllables, heavy penults carry the main stress. If neither superheavy syllables nor heavy penults are found, then stress could either fall on the light penult or light antepenult whichever is separated by an even number of syllables from the left edge of the word or from the preceding heavy syllable. Only one stress is manifested in Cairene MSA. No secondary stress is reported for this variety of MSA. Main stress is preferably located at the right edge of the word. The constraints employed to describe Cairene MSA are the familiar constraints for defining metrical structure in OT.

(i) GrWd=PrWd:

A grammatical word must be a prosodic word. (Kager, 1999)

(ii) PARSE-SYL:

Syllables are parsed by feet. (Kager, 1999)

(iii) MORAIC FOOT:[3]

A foot is built on moras.

(iv) NON-FINALITY:

The head *foot* of the PrWd must not be final. (Prince& Smolensky, 1993)

(v) FT-BIN$_{\mu}$:

Feet are binary under moraic analysis. (Kager, 1999)

(vi) RIGHTMOST:

Align (Hd-Ft, Right, PrWd, Right)

The head foot is rightmost in PrWd. (Kager, 1999)

(vii) ALIGN-STRAY(R)

Align (STRAY SYLLABLE, R, PRWD, R) (Al-Mohanna, 2007)

(viii) *FT

Feet are banned. (Prince & Smolensky, 1993)

Harmonic Serial Account of Cairene MSA Stress:

Arabic in general and Cairene MSA in particular have only one stress per word, no secondary stress is reported (Al-Mohanna, 2007; Crowhurst, 1996; Halle & Vergnaud, 1987; McCarthy, 1979a,b; Mitchell, 1960), the need for feet construction is restricted to only one foot in surface words. Hence, iterative foot parsing becomes redundant.[4] GEN in HS takes the input and generates a limited set of candidates where in each candidate only one faithfulness violation is incurred,[5] here, the construction of just one foot in different positions. The constructed foot is evaluated by EVAL through the constraint hierarchy. The locally optimal output of the first iteration is to be submitted to GEN again for another iteration. Here GEN again generates another set of candidates, incurring one more faithfulness violation in each while simultaneously maintaining any inherited foot in the course of deriving stress. In the second iteration, the generated candidates are evaluated by EVAL. If harmonic improvement is met, then EVAL selects an output for the second iteration. If harmonic improvement fails, which should be the case in Cairene MSA, the input should return as it is, hence surfacing with only one stress per word.

To make the point clear, a representative example is in order. Let us assume we have the input *√a.ra.fa.ku.maa*, 'knew-3SG.M-2DU'. GEN will provide a set of candidates whereby only one foot is constructed in each candidate.

√a.ra.fa.ku.maa → GEN →

a. (√a.ra).fa.ku.maa
b. √a.ra.(fa.ku).maa
c. √a.ra.fa.ku.(maa)
d. (√a).ra.fa.ku.maa
e. √a.(ra).fa.ku.maa
f. √a.ra.(fa).ku.maa
g. √a.ra.fa.(ku).maa

EVAL evaluates the candidates via the constraint hierarchy, to be developed, and selects the locally optimal output which is submitted again to GEN as the input for a second iteration. If the input for the second iteration returns as it is, it is the global optimum. This is exactly the desirable end we want to arrive at.

With the constraints so far discussed, a ranking is needed to obtain a right-aligned non-final foot as in the example *√a.ra.(fa≅.ku).maa*. NON-FINALITY is a fact of Cairene MSA. The foot, or to be precise the main and only foot, is never word-final. A word-final light or heavy syllable never carries the main and only stress in Cairene MSA. This obviously ranks NON-FINALITY high in the hierarchy. NON-FINALITY, (cf. NON-FINALITY (iv)), ensures that the head foot is not final in the prosodic word.[6] While NON-FINALITY is always respected in poly-syllabic words, it should be violated in mono-syllabic words, otherwise mono-syllabic words will surface unfooted. Hence, NON-FINALITY is ranked below GrWd=PrWd which guarantees minimal foot construction, requiring that every lexical word be properly parsed by being assigned a hierarchical prosodic structure. It ensures that footless lexical words are not optimal outputs in the grammar of the language. Hence, this constraint is top ranked in the hierarchy. Tableau (1) illustrates this ranking.

Tableau (1): GrWd=PrWd >> NON-FINALITY

Input: /qef/	GrWd=PrWd	NON-FINALITY
a. qef	W1	L
b. → (qe≅f)		1

One point worth noting about tableau (1) and the tableaux to come is that they are in the comparative format introduced by Prince (2002); integers replace asterisks, the optimal output is indicated with an arrow instead of a pointing hand, and the use of Ws and Ls. While Ws and Ls appear in cells of the loser candidates, a W in a cell indicates that the winning candidate, in this case (1b), does better than the losing candidate, in this case (1a), with regard to the particular constraint in that column, in this case GrWd=PrWd. An L indicates that the losing candidate, in this case (1a), does better than the winning candidate (1b), with regard to the particular constraint in that column, in this case NON-FINALITY. When the winning and losing candidates make the same number of violations for a particular constraint, neither W nor L is used and integers are used to mark the number of violations.

The main stress in Cairene MSA is left-headed, which means that feet are trochaic. FTFORM=TROCHEE is among the undominated constraints of the hierarchy. The MORAIC FOOT constraint, cited in (iii) above, builds feet on moras rather than syllables. MORAIC FOOT constraint is among the dominant constraints of the hierarchy. NON-FINALITY should also outrank RIGHTMOST, otherwise main stress will be realised in final positions. RIGHTMOST has to outrank FT-BIN$_{\mu}$ in order to derive penultimate stress in words with #HLH# syllabic structure; otherwise reverse ranking will optimise antepenultimate stress on heavy syllables which is never attested in Cairene MSA. PARSE-SYL which provides the impetus for foot building is ranked very low in the hierarchy as the need is restricted to only one foot construction per word. The constraint militating against building feet, *FT, is ranked above PARSE-SYL and is outranked by GrWd=PrWd.

Tableau (2) evaluates the input *ka.ta.ba*, 'wrote-3SG.M' which represents one stress pattern of Cairene MSA. Words consisting of three mono-moraic syllables are stressed on the light antepenult. The generated candidates are evaluated against the proposed constraint hierarchy developed so far.

Tableau (2):[7]

Input: /kataba/	M.F	NON-	RIGHT-	*FT	FT-	PARSE-

1st iteration		FINALITY	MOST		BIN$_{\mu}$	SYL
a.→ (ka≅.ta)ba			1	1		1
b. ka(ta≅)ba			1	1	W1	W2
c. (ka≅)ta.ba			W2	1	W1	W2
d. ka(ta≅.ba)		W1	L	1		1
e. ka.ta(ba≅)		W1	L	1	W1	W2

Candidates (2e,d) are ruled out for violating the high ranked NON-FINALITY, since the head foot is word-final. Candidate (2c) is ruled out for incurring more violations of RIGHTMOST compared to (2a) and (2b). This leaves (2a) and (2b). While both (2a) and (2b) incur the same number of violations concerning RIGHTMOST, candidate (11b) incurs more violations with regard to the unranked constraints *FT and FT-BIN$_{\mu}$, with two violations by (2b) compared to one violation by (2a). Therefore, candidate (2a) is the optimal output of the first iteration. To complete the derivation and in conformity with HS principles, the output of the first iteration is submitted again to GEN for subsequent derivation. Here the locally optimal output of the first iteration *(ka≅.ta)ba* could either return as it is, meaning that it is the best output of the second iteration, assuming that additional foot-building is not harmonically improving, hence signalling convergence; or the construction of another foot might bring about another optimal output if it fares better than the faithful candidate to the output of the first iteration, *(ka≅.ta)ba*. The constraint hierarchy is the same in both iterations. As the input to the second iteration, *(ka≅.ta)ba*, has only one syllable left unparsed, GEN could add only one foot constructed on the light syllable, *(ka≅.ta)(ba)*, hence only one candidate. This is in line with the Strict Inheritance Principle, (Pruitt, 2008, p. 6), stating that "any foot built in the course of deriving stress is inherited by every member of the candidate set for subsequent iterations". EVAL assesses the candidates to determine if harmonic improvement, a substantial tenet of HS, is met or failed. This is illustrated in tableau (3) below.

Tableau (3): ranking argument for the 2nd iteration[8]

Input: ⟨(ka⇔.ta)ba⟩ **2nd iteration**	M.F	NON-FINALITY	RIGHT-MOST	*FT	FT-BIN$_{\mu}$	PARSE-SYL
a. → (ka≅ta)ba			1	1		1
b. (ka≅.ta)(ba)			1	W2	W1	L

As shown in tableau (3), candidates (3a) and (3b) satisfy the high ranked constraints, namely MORAIC FOOT and NON-FINALITY. They also incur the same number of violations of the high ranked RIGHTMOST. However, candidate (3a) wins the competition over candidate (3b) with regard to the unranked *FT and FT-BIN$_{\mu}$, incurring only one violation compared to three by

(3b). The violation of *FT by candidate (3b) is marked in the cell by W2. The integer 2 means that this candidate, (3b), violates *FT twice. The W means that it favours the winning candidate, (3a). The violation of FT-BIN$_\mu$ by candidate (3b) is marked in the cell by W1 meaning that the candidate violates FT-BIN$_\mu$ once while the winning candidate (3a) satisfies it. Thus, candidate (3b), *(ka≅.ta)(ba),* loses on the grounds that it lacks harmonic improvement. Hence, the faithful candidate to the input, (3a), returns as the global optimal output. No further derivation continues and that signals convergence.

The derivation summary of stress in the input *ka.ta.ba* is given in the following tableau. All candidates of the first and second iteration are evaluated against the same set of constraints.

Tableau (4): derivation summary for the input /kataba/

Input: /kataba/ **1st iteration**	M.F	NON-FINALITY	RIGHT-MOST	*FT	FT-BIN$_\mu$	PARSE-SYL
a. → (ka≅.ta)ba			1	1		1
b. ka(ta≅)ba			1	1	W1	W2
c. (ka≅)ta.ba			W2	1	W1	W2
d. ka(ta≅.ba)		W1	L	1		1
e. ka.ta(ba≅)		W1	L	1	W1	W2
2nd iteration						
a. → (ka≅ta)ba			1	1		1
b. (ka≅.ta)(ba)		W1	1	W2	W1	L

Output (ka≅.ta)ba

Let us see if the ranking logic attained so far accounts for the penultimate stress in words of three-heavy-syllable sequence, such as, *kal.lam.tum*, 'talked to-2PL.M'. This is illustrated in tableau (5).

Tableau (5):

Input: /kallamtum/ **1st iteration**	GrWd= PrWd	NON-FINALITY	RIGHT-MOST	*FT	FT-BIN$_\mu$	PARSE-SYL
a. → kal(la≅m)tum			1	1		2
b. (ka≅l)lam.tum			W2	1		2
c. kal.lam(tu≅m)		W1	L	1		2
d. kal.lam.tum	W1		L	L		W3

According to tableau (5), candidate (5d) is ruled out for violating the undominated GrWd=PrWd. Candidate (5c) loses on the strength of violating the high ranked NON-FINALITY. The competition is focused between candidates (5a) and (5b). Although both candidates incur the same number of violations of the lower ranked constraints, candidate (5b) fares badly with regard to RIGHTMOST with two violations compared to one by (5a). Candidate (5a) wins over all its competitors, therefore (5a) is the optimal output of the first iteration. While (5a) is the attested output in Cairene MSA, this can not be confirmed until we submit it to another iteration to examine harmonic improvement and confirm whether we have actually attained the global output or a locally intermediate output. Tableau (6) illustrates the second iteration of the first winning candidate of tableau (5).

Tableau (6):

Input: ⟨kal(la≅m)tum⟩ **2nd iteration**	NON-FINALITY	RIGHT-MOST	*FT	FT-BIN$_\mu$	PARSE-SYL
a. → kal(la≅m)tum		1	1		2
b. (kal)(la≅m)tum		1	W2		L1
c. kal(la≅m)(tum)	W1	1	W2		L1

As tableau (6) illustrates, the second iteration selects candidate (6a) as the optimal output. However, candidate (6a) is the faithful candidate to the input. The second iteration returns the input as it is. No harmonic improvement is achieved by constructing another foot. This means candidate (6a) is the global output which is the attested output in Cairene MSA.

Tableau (7) presents a summary of the full derivation of the input *kal.lam.tum*. While candidate (7c) of the first iteration fares better than candidate (7b) as much as RIGHTMOST is concerned, it fatally violates the higher ranked NON-FINALITY. Candidate (7b) loses out to (7a) as (7b) incurs two violations of RIGHTMOST compared to one violation by (7a). Hence, candidate (7a) goes out of the first iteration as the locally optimal output and is passed to the second iteration. In the second pass of the derivation, GEN generates another set of candidates incurring only one violation of faithfulness, by constructing another foot while at the same time respecting the first foot of the locally optimal output in the first iteration. Candidates (7e,f,g) are evaluated against the same set of constraints. Candidate (7e), the faithful candidate to the output of the first iteration, wins over its competitors, as illustrated by the tableau in (7).

Tableau (7): derivation summary for the input /kallamtum/

Input: /kallamtum/ **1st iteration**	GrWd= PrWd	NON-FINALITY	RIGHT MOST	*FT	FT-BIN$_{\mu}$	PARSE-SYL
a. → kal(la≅m)tum			1	1		2
b. (ka≅l)lam.tum			W2	1		2
c. kal.lam(tu≅m)		W1	L	1		2
d. kal.lam.tum	W1		L	L		W3
2nd iteration						
e. → kal(la≅m)tum			1	1		2
f. (kal)(la≅m)tum			1	W2		L1
g. kal(la≅m)(tum)		W1	1	W2		L1

Output: kal(la≅m)tum

The stressing of light penultimate syllables in #HLH# has been a challenge to various OT accounts. Let us see how the proposed constraint hierarchy deals with this syllabic configuration. Tableau (8) shows the evaluation of the input *mak.ta.bah* 'library'.

Tableau (8):

Input: /maktabah/ **1st iteration**	GrWd= PrWd	M.F	NON-FINALITY	RIGHT-MOST	*FT	FT-BIN$_{\mu}$	PARSE-SYL
a. → mak(ta≅)bah				1	1	1	2
b. (ma≅k)ta.bah				W2	1	L	2
c. mak.ta(ba≅h)			W1	L	1	L	2
d. (ma≅k.ta)bah		W1		1	1	1	L1
e. mak.ta.bah	W1			L	L	L	W3

Candidates (8e) and (8d) are ruled out for violating the undominated GrWd=PrWd and MORAIC FOOT respectively. Candidate (8c) is out for violating the high ranked NON-FINALITY. The competition is focused between (8a) and (8b). Candidate (8a) bests candidate (8b) as it incurs fewer violations of RIGHTMOST. It also satisfies the undominated constraints; it satisfies GrWd=PrWd by constructing one foot and MORAIC FOOT as the foot is built on moras, one mora in the case of (8a). Candidate (8a) is the optimal output in the first iteration and is therefore passed to the second iteration as shown in tableau (9) below.

Tableau (9):

Input: ⟨mak(ta≅)bah⟩ **2nd iteration**	M.F	NON-FINALITY	RIGHT MOST	*FT	FT-BIN$_{\mu}$	PARSE-SYL

a. → mak(ta≅)bah			1	1	1	2
b. (mak)(ta≅)bah			1	W2	1	L1
c. mak(ta≅)(bah)			1	W2	1	L1

Candidates (9c) and (9b) are ruled out for incurring more violations of the unranked constraints *FT and FTBIN$_{\mu}$ than candidate (9a). Therefore, candidate (9a) is the selected optimal output and is actually the faithful candidate to the input. This shows that no harmonic improvement is achieved which signals convergence. Candidate (9a) is, as a matter of fact, the attested output in Cairene MSA where the light penultimate syllable carries the main stress in words with #HLH# syllabic structure.

Tableau (10) presents a summary of the full derivation of the input *mak.ta.bah*, 'library'.

Tableau (10): derivation summary for the input /maktabah/

Input: /maktabah/ **1st iteration**	GrWd= PrWd	M.F	NON-FINALITY	RIGHT MOST	*FT	FT-BIN$_{\mu}$	PARSE-SYL
a. → mak(ta≅)bah				1	1	1	2
b. (ma≅k)ta.bah				W2	1	L	2
c. mak.ta(ba≅h)			W1	L	1	L	2
d. (ma≅k.ta)bah		W1		1	1	1	L1
e. mak.ta.bah	W1			L	L	L	W3
2nd iteration							
f. → mak(ta≅)bah				1	1	1	2
g. (mak)(ta≅)bah				1	W2	1	L1
h. mak(ta≅)(bah)				1	W2	1	L1

Output: mak(ta≅)bah

Tableaux (11) and (12) give the first and second iterations respectively of an #HLLLLH# sequence word, e.g. *ʔad.wi.ya.tu.hu.maa*, 'medicine (NOM.SG)-3DU.POSS'.

Tableau (11):

Input: //adwiyatuhumaa/ **1st iteration**	GrWd= PrWd	M.F	NON-FINALITY	RIGHT MOST	*FT	FT-BIN$_{\mu}$	PARSE-SYL
a. → /ad.wi.ya(tu≅.hu)maa				1	1		4
b.				1	1	W1	W5

/ad.wi.ya.tu(hu≅)maa							
c. /ad.wi.ya(tu≅)hu.maa				W2	1	W1	W5
d. /ad(wi≅.ya)tu.hu.maa				W3	1		4
e. /ad.wi.ya.tu.hu(ma≅a)			W1	L	1		W5
f. /ad.wi.ya.tu.hu.maa	W1			L	L		W6

Over all the candidates generated by GEN, candidate (11a) is the locally optimal output in the first iteration. Upon submitting the winning candidate to the second iteration, as shown in tableau (12), the faithful candidate to the input, (12a), wins over all competitors signalling convergence. The global optimal output is *⁄ad.wi.ya(tu≅.hu)maa*.

Tableau (12):

Input: ⟨/ad.wi.ya(tu≅.hu)maa⟩ **2nd iteration**	M.F	NON-FINALITY	RIGHT MOST	*FT	FT-BIN$_{\mu}$	PARSE-SYL
a. → /ad.wi.ya(tu≅.hu)maa			1	1		4
b. /ad(wi.ya)(tu≅.hu)maa			1	W2		L2
c. (/ad)wi.ya(tu≅.hu)maa			1	W2		L3
d. /ad(wi)ya(tu≅.hu)maa			1	W2	W1	L3
e. /ad.wi(ya)(tu≅.hu)maa			1	W2	W1	L3
f. /ad.wi.ya(tu≅.hu)(maa)			1	W2		L3

Tableaux (13) and (14) show the first and second iterations respectively of a word with #LHLLL# syllabic structure, e.g. *yu.raa.si.lu.ka*, 'corresponds with-3SG.M.IND-2SG.M'.

Tableau (13):

Input: /yuraasiluka/ **1st iteration**	M.F	NON-FINALITY	RIGHT MOST	*FT	FT-BIN$_{\mu}$	PARSE-SYL
a. → yu.raa(si≅.lu).ka			1	1		3
b. yu.raa.si(lu≅)ka			1	1	W1	W4
c. yu(ra≅a)si.lu.ka			W3	1		W4
d. yu.raa(si≅)lu.ka			W2	1	W1	W4
e. (yu≅)raa.si.lu.ka			W4	1	W1	W4
f. yu.raa.si(lu≅.ka)		W1	L	1		3
g. yu.raa.si.lu(ka≅)		W1	L	1	W1	W4

Candidate (13a) is the locally optimal output of the first iteration. It passes through another iteration to determine harmonic improvement as shown in tableau (14).

Tableau (14):

Input:	M.F	NON-	RIGHT	*FT	FT-	PARSE-

⟨yu.raa(si≅.lu)ka⟩ **2nd iteration**		FINALITY	MOST		BIN$_{\mu}$	SYL
a. → yu.raa(si≅.lu)ka			1	1		3
b. yu(raa)(si≅.lu)ka			1	W2		L2
c. (yu)raa(si≅.lu)ka			1	W2	W1	L2
d. yu.raa(si≅.lu)(ka)			1	W2	W1	L2
e. (yu.raa)(si≅.lu)ka	W1		1	W2	W1	L1

As shown in tableau (14), harmonic improvement fails since the construction of another foot on any candidate makes that candidate unable to compete with the faithful candidate to the input, (14a). Therefore, candidate (14a) is the global optimum.

Tableaux (15) and (16) show the first and second iterations respectively of an #LLLLL# sequence word, e.g. *Σa.dZa.ra.tu.hu*, 'tree(NOM.SG)-3SG.M.POSS'.

Tableau (15):

Input: /ΣadZaratuhu/ **1st iteration**	M.F	NON-FINALITY	RIGHT MOST	*FT	FT-BIN$_{\mu}$	PARSE-SYL
a. → Σa.dZa(ra≅.tu)hu			1	1		3
b. Σa.dZa.ra(tu≅)hu			1	1	W1	W4
c. Σa(dZa≅.ra)tu.hu			W2	1		3
d. Σa.dZa(ra≅)tu.hu			W2	1	W1	W4
e. (Σa≅.dZa)ra.tu.hu			W3	1		3
f. Σa.dZa.ra(tu≅.hu)		W1	L	1		3

Candidate (15a) is the locally optimal output of the first iteration. It passes through another iteration to determine harmonic improvement as shown in tableau (16).

Tableau (16)

Input: ⟨Σa.dZa(ra≅.tu)hu⟩ **2nd iteration**	M.F	NON-FINALITY	RIGHT MOST	*FT	FT-BIN$_{\mu}$	PARSE-SYL
a. → Σa.dZa(ra≅.tu)hu			1	1		3
b. (Σa.dZa)(ra≅.tu)hu			1	W2		L1
c. Σa.dZa(ra≅.tu)(hu)			1	W2	W1	L2

As shown in tableau (16), passing the output of the first iteration into a second iteration does not increase harmonic improvement. Therefore, the faithful candidate to the input, (16a), is the global optimal output.

The proposed constraint hierarchy has, so far, been able to account for the correct placement of stress in Cairene MSA. However, there are still some words that the constraint hierarchy cannot handle properly. These include #LLLH#, as in *ka.sa.ra.hum*, 'broke-3SG.M-3PL.M'; *ʕa.ra.fa.hum*, 'knew-3SG.M-3PL.M'; *ʕa.ra.fa.naa*, 'knew-3SG.M-1PL'; and #HLLLH#, as in *kaa.ta.ba.hu.maa*, 'corresponded with-3SG.M-3DU'; *kal.la.ma.hu.maa*, 'talked to-3SG.M-3DU'; *daa.ʔi.ra.tu.hum*, 'constituency(NOM.SG)-3PL.M.POSS'; and *man.zi.la.tu.haa*, 'status(NOM.SG)-3SG.F.POSS'. While main stress falls on the light penultimate syllable in attested words, the constraint hierarchy developed so far derives antepenultimate stress. In order to optimise the correct attested output through the constraint hierarchy, we build on ALIGN-STRAY(R) constraint (Al-Mohanna, 2007):

ALIGN-STRAY(R)
Align (STRAY SYLLABLE, R, PRWD, R)

ALIGN-STRAY(R) requires the unparsed (stray) syllable to be on the right periphery. It is violated by any candidate that has a stray syllable to the left of the constructed foot. Given an input like *mak(ta)bah*, the initial heavy syllable might be construed as stray and therefore constitutes a violation of ALIGN-STRAY(R). This, however, is not what we mean by the stray syllable. By the stray syllable, we refer to the mono-moraic syllable that is located to the left of the constructed foot. Should there be more than one mono-moraic syllable to the left of the constructed foot, they do not come under our definition of the light stray syllable. Therefore, building on ALIGN-STRAY(R), we propose the more specific following constraint.

ALIGN-LIGHTSTRAY(R)
Align (STRAY LIGHT SYLLABLE, R, PRWD, R)

This constraint restricts the meaning of a stray syllable to the mono-moraic syllable that is positioned to the left of the constructed foot. Let us consider the following syllabic structured words and see if they have left stray syllables.

	ALIGN-LIGHTSTRAY(R)
a. L(H)L	×
b. LL(LL)L	√
c. HL(H)H	×
d. LH(LL)L	×
e. LLL(LL)L	√

ALIGN-LIGHTSTRAY(R) should be outranked by RIGHTMOST; it is more important to have the only foot right aligned than to have the light stray syllable right adjoined. On the other hand it should outrank FT-BIN$_\mu$ so that a foot constructed on a light syllable could be sanctioned as the head foot of the word. This is demonstrated in the following tableau.

Tableau (17):

Input: /katabta/	M.F	NON-FINALITY	RIGHT MOST	*FT	ALIGN-LIGHT STRAY(R)	FT-BIN$_\mu$	PARSE-SYL
a. → ka(ta≅b)ta			1	1	1		2
b. (ka≅)tab.ta			W2	1	L	W1	2
c. ka.tab(ta≅)		W1	L	1	1	W1	2
d. (ka≅.tab)ta	W1		1	1	L	W1	L1

Tableau (17) shows how the relative ranking between ALIGN-LIGHTSTRAY(R) and RIGHTMOST. When ALIGN-LIGHTSTRAY(R) is outranked by RIGHTMOST, candidate (17a) is optimal. However, if ALIGN-LIGHTSTRAY(R) outranks RIGHTMOST, then candidate (17b) becomes the optimal output. That is so because (17b) satisfies ALIGN-LIGHTSTRAY(R) while candidate (17a) violates it since there is a light syllable to the left of the constructed foot. Since the stray syllable in (17a) is not right aligned, it constitutes a violation of ALIGN-LIGHTSTRAY(R). Candidate (17c) also violates ALIGN-LIGHTSTRAY(R) since there is a light syllable to the left of the constructed foot. With evidence from Cairene MSA data, heavy penults are always stressed. Therefore, RIGHTMOST should outrank ALIGN-LIGHTSTRAY(R).

Tableau (18) shows how the revised constraint hierarchy accounts for penultimate stress in #LLLH#, as in *ka.sa.ra.hum*, 'broke-3SG.M-3PL.M'.

Tableau (18):

Input: /kasarahum/ **1st iteration**	M.F	NON-FINALITY	RIGHT MOST	*FT	ALIGN-LIGHT STRAY(R)	FT-BIN$_\mu$	PARSE-SYL
a.→ ka.sa(ra≅)hum			1	1		1	3
b. ka(sa≅.ra)hum			1	1	W1	L	L2
c. (ka≅.sa)ra.hum			W2	1		L	L2
d. ka.sa.ra(hu≅m)		W1	L	1		L	3
e. ka.sa.(ra.hu≅m)	W1	W1	L	1		1	L2

Candidate (18e) is ruled out for violating the undominated MORAIC FOOT. Candidate (18d) is ruled out due to the gratuitous violation of NON-FINALITY.

Candidate (18c) incurs more violations of RIGHTMOST than the other remaining candidates, (18a) and (18b). This leaves candidates (18a) and (18b). While candidates (18a) and (18b) incur equal violations with regard to RIGHTMOST, candidate (18a) bests candidate (18b) with regard to the unranked *FT and ALIGN-LIGHTSTRAY(R). Candidate (18a) incurs one violation compared to two by (18b). Hence, candidate (18a) is the locally optimal output of the first iteration. Candidate (18a) passes through the second iteration to determine harmonic improvement. Tableau (19) illustrates the second iteration of the optimal output of the first iteration.

Tableau (19):

Input: ⟨ka.sa(ra≅)hum⟩ **2nd iteration**	NON-FINALITY	RIGHT MOST	*FT	ALIGN-LIGHT STRAY(R)	FT-BIN$_{\mu}$	PARSE-SYL
a. → ka.sa(ra≅)hum		1	1		1	3
b. (ka.sa)(ra≅)hum		1	W2		1	L1
c. ka.(sa)(ra≅)hum		1	W2	W1	W2	L2

Of the candidates (19a,b,c), candidate (19a) outperforms candidates (19b) and (19c) as (19a) incurs fewer violations of *FT. The optimal output, (19a), is the faithful candidate to the input. Hence, it is the global output and the one attested in Cairene MSA.

Tableaux (20) and (21) show the first and second iterations respectively of a word with #HLLLH# syllabic structure, as in *kaa.ta.ba.hu⇔.maa*, 'corresponded with-3SG.M-3DU'.

Tableau (20):

Input: /HLLLH/ **1st iteration**	M.F	NON-FINALITY	RIGHT MOST	*FT	ALIGN-LIGHT STRAY(R)	FT-BIN$_{\mu}$	PARSE-SYL
a. → HLL(L⇔)H			1	1		1	4
b. HL(L⇔ L)H			1	1	W1	L	L3
c. (H□)LLLH			W4	1		L	4
d. HLLL(H□)		W1	L	1		L	4

Candidate (20d) is ruled out for violating the high ranked NON-FINALITY. Candidate (20c) loses due to its poor performance on RIGHTMOST. While the remaining candidates, (20a) and (20b), incur the same number of violations of RIGHTMOST, candidate (20a) outperforms (20b) with regard to the unranked constraints *FT and ALIGN-LIGHTSTRAY(R). Candidate (20a) incurs one violation of *FT and satisfies ALIGN-LIGHTSTRAY(R), but candidate (20b) violates each with one violation. Therefore, candidate (20a) bests all other candidates in the tableau and is the locally optimal output of the first iteration. It passes through the second iteration as shown below.

Tableau (21):

Input: 〈HLL(L⇔)H〉 **2nd iteration**	NON-FINALITY	RIGHT MOST	*FT	ALIGN-LIGHT STRAY(R)	FT-BIN$_{\mu}$	PARSE-SYL
a. → HLL(L⇔)H		1	1		1	4
b. H(LL)(L⇔)H		1	W2		1	L2
c. HLL(L⇔)(H)	W1	1	W2		1	L3

Candidate (21a) bests all other candidates in the second iteration. It is also the faithful candidate to the input. Hence, it is the global output and is the one attested in Cairene MSA.

Tableaux (22) and (23) show the first and second iterations respectively of a word with #LLLL# syllabic structure, as in *ka.ta.ba.hu*, 'wrote-3SG.M-3SG.M' and *ʕa.ra.fa.ka*, 'knew-3SG.M-2SG.M'.

Tableau (22):

Input: /LLLL/ **1st iteration**	M.F	NON-FINALITY	RIGHT MOST	*FT	ALIGN-LIGHT STRAY(R)	FT-BIN$_{\mu}$	PARSE-SYL
a. → LL(L⇔)L			1	1		1	3
b. L(L⇔ L)L			1	1	W1	L	L2
c. LL(L⇔ L)		W1	L	1		L	L2

Candidate (22a) outperforms all other candidates in the tableau and is the locally optimal output of the first iteration. It passes through the second iteration as shown in (23) below.

Tableau (23):

Input: 〈LL(L⇔)L〉 **2nd iteration**	NON-FINALITY	RIGHT MOST	*FT	ALIGN-LIGHT STRAY(R)	FT-BIN$_{\mu}$	PARSE-SYL
a. → LL(L⇔)L		1	1		1	3
b. (LL)(L⇔)L		1	W2		1	L1
c. LL(L⇔)(L)		1	W2		W2	L2
d. L(L)(L⇔)L		1	W2	W1	W2	L2

Candidate (23a) outperforms all other candidates in the second iteration. It is also the faithful candidate to the input. No harmonic improvement is achieved by constructing another foot to the input. Therefore, candidate (23a) returns as the global optimum. It is also the attested output in Cairene MSA.

Superheavy Syllables:

Another distinguishing characteristic of many Arabic dialects as well as Cairene MSA is final superheavy syllables, CVVC or CVCC. These types of syllables are called "superheavy" for the extra consonantal slot attached to the already heavy, CVC or CVV syllable. Superheavy syllables are also attested in languages other than Arabic, such as Norwegian (Rice, 2003, 2006; Lunden, 2006), Hindi (Hayes, 1995), Punjabi (Vijayakrishnan, 2007), Finnish, Latin, and Hungarian (Gordon, 2006), and Italian (Krämer, 2009) to mention a few. While some languages may allow superheavy syllables in various positions such as Hindi (Hayes, 1981; Lunden, 2006), other languages such as MSA (McCarthy, 1979a,b; Hayes, 1980) and Norwegian (Rice, 2006; Lunden, 2006; Kristoffersen, 2000) restrict them to word final positions. According to Gadoua (2007), superheavy syllables in MSA may not be considered a basic syllable type, owing to their restricted positional occurrence, word-finally, noting that they arise from the interaction of two phonological constraints; i) the deletion of a short vowel at the end of a phrase and ii) the prohibition of a paragoge rule, i.e., the insertion of one or more elements at the end of a word.

While superheavy syllables are restricted to pausal words in MSA, in non-pausal positions, the final C of these syllables is syllabified with the vocalic melody of a vowel-initial morpheme, or with an epenthetic vowel when the following morpheme is consonant initial.

Several proposals have been made in the literature regarding the identity of word final consonants. Word final consonants could be taken as a separate extra-metrical constituent of the syllable. That is an appendix attached to the syllable node (Halle & Vergnaud, 1982), or a catalexis, meaning an empty prosodic constituent attached to the edge of the domain (Kiparsky, 1991, as cited in Kager, 1995; Burzio, 1994), or as onsets of a syllable whose nucleus is empty (Kaye, 1990; Harris & Gussman, 2003). Kiparsky (2003) refers to the final consonant in superheavy syllables in Arabic dialects as semisyllables, unsyllabified moras that may or may not be adjoined to the prosodic word depending on the type the dialect belongs to.[9]

We follow McCarthy (1979a,b) in treating final Cs in superheavy syllables as degenerate syllables. That being the case, final superheavy syllables are then a combination of a heavy penult and final degenerate syllable. Therefore, a word like *duk.kaan*, 'shop' is syllabified as *duk.kaa.n*. Stress in such words is realised eventually on the penultimate syllable, hence does not violate NON-FINALITY. Tableaux (24) and (25) illustrate the first and second iterations respectively of the input *duk.kaan*, 'shop'.

Tableau (24):[10]

Input: /dukkaan/ **1st iteration**	M.F	NON-FINALITY	RIGHT MOST	*FT	ALIGN-LIGHT STRAY(R)	FT-BIN$_{\mu}$	PARSE-SYL
a. → duk(ka≅a)n			1	1			2
b. (du≅k)kaa.n			W2	1			2
c. duk(ka⇔an)	W1	W1	L	1		W1	L1

Candidate (24c) is ruled out for violating the undominated constraint, namely MORAIC FOOT. Candidate (24b) is ruled out for incurring two violations of RIGHTMOST. Candidate (24a) is the locally optimal output in the first iteration. It passes through another iteration to determine harmonic improvement as shown below.

Tableau (25):

Input: ⟨duk(kaa)n⟩ **2nd iteration**	NON-FINALITY	RIGHT MOST	*FT	ALIGN-LIGHT STRAY(R)	FT-BIN$_{\mu}$	PARSE-SYL
a. → duk(ka≅a)n		1	1			2
b. (duk)(ka⇔a)n		1	W2			L1
c. duk(ka≅a)(n)		1	W2		W1	L1

Of the candidates (25a,b,c), candidate (25a) fares better with regard to *FT. Candidate (25a) is then the optimal output and is also the faithful candidate to the input of the second iteration. Therefore, no harmonic improvement is achieved by constructing another metrical foot on the remaining unparsed string of elements. The derivation converges at this point and the faithful candidate to the input, (25a), is the global output.

Parallel OT versus HS

The parallel evaluation mechanism of OT is the most salient characteristic that sets it apart from HS which involves a type of derivation in the input-output mapping. This section demonstrates that the constraint hierarchy developed in section three could be used in a parallel OT account and still captures the stress patterns of Cairene MSA. We argue that the HS account and parallel OT account fare equally with regard to the absence of secondary stresses in Cairene MSA. The former justifies the absence of secondary stresses to the lack of harmonic improvement and the latter achieves the same as a result of the conflicting constraints.

Let us consider the following tableau that evaluates the input *ka.ta.ba*, 'wrote-3SG.M'**.**

Tableau (26):

Input: kataba	M.F	NON-FINALITY	RIGHT MOST	*FT	ALIGN-LIGHT STRAY(R)	FT-BIN$_{\mu}$	PARSE-SYL
a. ☞ (ka≅.ta)ba			*	*			*
b. (ka≅.ta)(ba)			*	**!		*	
c. (ka≅)ta.ba			**!	*		*	**
d. ka(ta≅.ba)		*!		*	*		*

Candidate (26d) is out of the running for violating the high ranked constraint NON-FINALITY. Candidate (26c) performs badly with regard to RIGHTMOST, with two violations compared to one violation each by candidates (26a) and (26b). This leaves (26a) and (26b). Of these two, candidate (26a) bests candidate (26b) as the latter violates *FT twice while the former violates it only once. Therefore, candidate (26a) is the optimal output.

Let us see how parallel OT account fares in the stressing of light penultimate syllables in #HLH#. Tableau (27) illustrates the evaluation of the input *mak.ta.bah* 'library'.

Tableau (27):

Input: maktabah	M.F	NON-FINALITY	RIGHT MOST	*FT	ALIGN-LIGHT STRAY(R)	FT-BIN$_{\mu}$	PARSE-SYL
a. ☞ mak(ta≅)bah			*	*		*	**
b. (ma∃k)(ta≅)(bah)			*	**!*		*	
c. (ma≅k)ta(ba∃h)			**!	**	*		*
d. (ma≅k.ta)(bah)	*!		*	**		*	
e. mak(ta≅.bah)	*!	*			*	*	*

Candidates (27e) and (27d) are out of the running for violating the undominated constraint MORAIC FOOT. Candidate (27c) is ruled out for incurring more violations of the high ranked RIGHTMOST compared to the other remaining candidates (27a) and (27b). Of the remaining candidates, (27a) and (27b), candidate (27a) fares better with regard to *FT. Therefore, candidate (39a) is the optimal output.

Tableau (28) evaluates the input *ka.ta.ba.hu*, 'wrote-3SG.M-3SG.M'.

Tableau (28):

Input: katabahu	NON-FINALITY	RIGHT MOST	*FT	ALIGN-LIGHT STRAY(R)	FT-BIN$_\mu$	PARSE-SYL
a. ☞ ka.ta(ba⇔)hu		*	*		*	***
b. ka(ta⇔.ba)hu		*	*	*!		**
c. (ka⇔.ta)(ba)hu		**!	**		*	*
d. (ka.ta)(ba⇔.hu)	*!		**			

As shown in tableau (28), candidate (28d) is ruled out for violating the high ranked constraint NON-FINALITY. Candidate (28c) incurs more violations of RIGHTMOST than the other remaining candidates, (28a) and (28b). While candidates (28a) and (28b) incur the same number of violations with regard to the high ranked RIGHTMOST, candidate (28a) outperforms candidate (28b) with regard to the unranked constraints *FT and ALIGHN-LIGHT-STRAY(R). Hence, candidate (28a) is the optimal output.

The tableaux (26-28) illustrate that the parallel OT account is also able to capture the stress patterns in Cairene MSA. The HS account and parallel OT account fare equally with regard to the absence of secondary stresses in this variety of MSA. Both reflect that it is suboptimal to build more than one foot in a word; HS attributes that to the failure to achieve the Harmonic Improvement Condition while parallel OT attributes it to the poor performance on the high ranked *FT.

Conclusion

In a nutshell, the study proposes a constraint-based account of stress in Cairene MSA within the HS framework. The analysis of data show that metrical foot construction in Cairene MSA falls in line with the main tenets of HS. Thus, secondary stresses are not attested in Cairene MSA as building more feet does not improve harmony. The proposed constraint hierarchy that is developed in our proposal accounts for all the stress patterns of Cairene MSA. The interaction between the NON-FINALITY, RIGHTMOST, and ALIGN-LIGHTSTRAY(R) takes care of attaining the correct stress placement. Notably, FT-BIN$_\mu$ is ranked at the bottom of the hierarchy because degenerate feet are allowed to surface in Cairene MSA carrying the main stress of the word. Among the high ranked constraints, NON-FINALITY takes its place since the head foot is never word-final in this variety of MSA. Besides, the study provides an account for the superheavy syllables which are attested word finally in Cairene MSA.

Furthermore, the study shows that a parallel evaluation of inputs is possible under a standard parallel OT analysis. That is to say, HS and parallel

OT fare equally with respect to the absence of secondary stresses in Cairene MSA. The former justification of the absence of secondary stresses is attributed to the lack of harmonic improvement and the latter accounted for it in terms of the conflicting constraints.

References

.

Al-Mohanna, F. (2007). *An optimal alternative to iterative footing*. Retrieved April 25, 2008, from ROA: http://roa.rutgers.edu/files/895-0107/895-AL-MOHANNA-0-0.PDF

Al-Shar'abi, T. (2009). Phonologically determined morphology in Shar'abi dialect of Arabic. *English and Foreign Languages University Occasional Papers in Linguistics, 13,* 65-71.

Burzio, L. 1994. Principles of English Stress. Cambridge, UK: Cambridge University Press. Cambridge Studies in Linguistics 72.

Crowhurst, M. J. (1996). An optimal alternative to conflation. *Phonology, 13* (3), 409-424.

Gadoua, A. (2000). Consonant cluster in Quranic Arabic. Cahiers Linguistiques d' Ottawa, 28, 59-85.

Gordon, M. (2006). *Syllable weight: Phonetics, phonology, typology*. (L. Horn, Ed.) New York and London: Routledge.

Halle, M. & Vergnaud J. (1987b). *An essay on stress.* Cambridge: MIT Press.

Halle, M. & Vergnaud, J. (1982). Three dimensional phonology. *Journal of Linguistic Research, 1*, 83-105.

Harris, J. & Gussmann, E. (2003). *Word-final onsets*. Retrieved November 26, 2009, from ROA: http://roa.rutgers.edu/files/575-0203/575-0203-HARRIS-0-0.PDF

Hayes, B. (1980). A metrical theory of stress rules. Ph.D Thesis. MIT.

Hayes, B. (1995). *Metrical stress theory*. Chicago and London: The University of Chicago Press.

Kager, R. (1999). *Optimality theory*. Cambridge: Cambridge University Press..

Kaye, J. (1990) `Government in phonology: The case of Moroccan Arabic'. The Linguistic Review 6, 131-160.

Kiparsky, P. (2003). Syllables and moras in Arabic. In C. F. Vijver, *Syllables in Optimality Theory* (pp. 147-182). Cambridge: Cambridge University Press.

Krämer, M. (2009). *The phonology of Italian.* Oxford: Oxford University Press.

Kristoffersen, G. (2000). *The phonology of Norwegian.* Oxford : Oxford University Press.

Lunden, S. A. (2006). *Weight, final lengthening and stress: A phonetic and phonological case study of Norwegian.* PhD Thesis. University of California.

McCarthy, J. (1979a). *Formal problems in Semitic phonology and morphology.* Ph.D Thesis. Cambridge: MIT.

McCarthy, J. (1979b). On stress and syllabification. *Linguistic Inquiry, 10* (3), 443-465.

McCarthy, J. (1981). A prosodic theory of nonconcatenative morphology. *Linguistic Inquiry, 12,* 337-418.

McCarthy, J. (1989). Linear order in phonological representation. *Linguistic Inquiry, 20* (1), 71-99.

McCarthy, J. (1993). Template form in prosodic morphology. In Stvan, L. et al. (eds.), *Papers from the Third Annual Formal Linguistics Society of Midamerica Conference,* pp. 187-218. Bloomington: Indiana University Linguistics Club.

McCarthy, J. (1999). Sympathy and phonological opacity. *Phonology, 16*, 331-399.

McCarthy, J. (2003). Sympathy, cumulativity, and the Duke-of-York gambit. In C. Féry, & R. v. Vijver (Eds.), *The syllable in optimality theory* (pp. 23-76). Cambridge: Cambridge University Press.

McCarthy, J. (2005). Optimal paradigms. In L. Downing, T. Hall, & R. Raffelsiefen (Ed), *Paradigms in phonological theory* (pp. 170-210). Oxford: Oxford University Press.

McCarthy, J. (2008). The serial interaction of stress and syncope. *Natural Language and Linguistic Theory, 26*, 499-546.

McCarthy, J., & Prince, A. (1986). *Prosodic morphology.* Unpublished manuscript, Amherst and New Brunswick: University of Massachusetts and Rutgers University.

McCarthy, J., & Prince, A. (1990a). Foot and word in prosodic morphology: The Arabic broken plural. *Natural Language and Linguistic Theory, 8*, 209-283.

McCarthy, J., & Prince, A. (1990b). Prosodic morphology and templatic morphology. In M. Eid, & J. McCarthy (Eds.), *Perspectives on Arabic linguistics II* (pp. 1-54). Amsterdam: John Benjamins.

McCarthy, J., & Prince, A. (1993b). Generalized alignment. In *Yearbook of morphology* (pp. 79-153).

Mitchell, T. F. (1960). Prominence and syllabication in Arabic. *Bulletin of the School of Oriental and African Studies, University of London, 23* (2), 369-389.

Mitchell, T. F. (1975). Some preliminary observations on the Arabic Koine. *British Society for Middle Eastern Studies, 2* (2), 70-86.

Prince, A. (2002). *Arguing optimality*. Retrieved June 15, 2009, from ROA: http://roa.rutgers.edu/files/562-1102/562-1102-PRINCE-0-0.PDF

Prince, A., & Smolensky, P. (1993). *Optimality theory: Constraint interaction in generative grammar*. Piscataway: Technical Report # 2 of the Rutgers Center for Cognitive Science. Rutgers University.

Pruitt, K. (2008). *Iterative foot optimization and locality in stress systems*. Retrieved February 10, 2009, from ROA: http://roa.rutgers.edu/files/999-1108/999-PRUITT-0-0.PDF

Rice, C. (2006). Norwegian stress and quantity: The implications of loanwords. *Lingua, 116* (7), 1171-1191.

Vijayakrishnan, K.G. (2007). The disyllabic word minimum: Variation on a theme in Bangla. In J. Bayer, T. Bhattacharya, & M. H. Babu, *Linguistic Theory and South Asian*

Languages: Essays in Honor of K.A. Jayaseelan (pp. 237-247). Amsterdam: John Benjamins Publishing Company.

End Notes

[1] Many previous OT accounts of Cairene MSA have fallen short of capturing all stress patterns attested in this dialect, including Al-Jarrah (2008a,b), Al-Mohanna (2007), Crowhurst (1996), and de Lacy (1998), all of which are reviewed in Al-Shar'abi (to appear).

[2] Weight is instrumental in predicting the stress placement in the first two windows from the right. That is, heavy syllables do not attract stress if located in the antepenultimate syllable of the word as fully demonstrated below.

[3] To the best of my knowledge, the MORAIC FOOT constraint has not been used in the literature of OT and if that is the case, we claim the formation of the same.

[4] Non-head feet resulting from iterative parsing in earlier metrical accounts are assumed to be removed via a phonological rule of conflation, so no phonetic consequences could, in principle, have effect, as advocated by Halle and Vergnaud (1987a, pp. 52-55) and Hayes' (1995, p. 119) reformulation of it. The rule suppresses constituents whose heads are not dominant in higher levels. Thus, a single primary stress is preserved in any given word.

[5] Here we assume that metrical foot construction constitutes a faithful violation.

[6] The other version of NON-FINALITY, (Prince & Smolensky, 1993, p. 40) excludes stressed syllables from word final positions. However, this constraint optimises unattested outputs with penultimate stress in words with #LLL#, or #HLLL# syllabic structure.

[7] Candidates violating the undominated constraint FTFORM=TROCHEE are not considered for brevity.

[8] Angle brackets 〈 〉 are used to indicate the second iteration while the first iteration is marked by slash brackets / /.

[9] Kiparsky (2003) identifies three types of Arabic dialects; CV-, VC- and C- dialects. He maintains that these dialects differ in whether they license unsyllabifiable consonants by moras adjoined to the prosodic word, semisyllables.

[10] We assume that a foot built over three moras is not licensed in Cairene MSA. Therefore, the constraint militating against this type of foot structure, $*F_{\mu\mu\mu}$, is among the undominated constraints. Other constraints such as syllable integrity, (Blevins, 1995; Prince & Smolensky, 1993; Hayes, 1995), are also among the undominated constraints. Syllable integrity preserves the integrity of syllables. It ensures that heavy CVC syllables are not split into CV+C.