EXTRAMETRICALITY REVISITED

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Abstract
This research paper advances the claim that extrametricality (Liberman & Prince 1977, McCarthy 1979b, Hayes 1982, 1995, Hammond 1999, Kiparsky 2003, Watson 2007, among others) can be constrained to syllable extrametricality, eliminating consonant, mora, and (presumably) foot extrametricality. This paper presents a basic analysis of parse (LICENSE-SEG) and antiparse (NONFINAL-SEG) constraints for dealing with stress placement (or lack thereof) on final syllables. The main thrust of the argument is twofold: (1) both parse and antiparse constraints are parameterized relative to the weight of the constituent to which they apply, and (2) the constraints that require syllables to be incorporated into higher level prosodic structure (LICENSE-SEG) conflict with constraints that require final syllable to remain stray (NONFINAL-SEG). The antiparse constraint NONFINAL-SEG is factored out into NONFINAL(C), NONFINAL(V), NONFINAL(σ), NONFINAL(F), and NONFINAL(PR). And, in order for extrametricality to be constrained just to syllable extrametricality, we advance the claim that NONFINAL(σ), in particular, is mora-sensitive, and can be further parameterized into a family of subconstraints (NONFINAL-μ, NONFINAL-μμ, NONFINAL-μμμ) differing in the weight of the syllable to which they apply. Similarly, by adopting the Strict Layering requirement (for details see Nespor and Vogel 1986: 7), the parse constraint LICENSE-SEG is decomposed into LICENSE(C), LICENSE(V), LICENSE(σ), LICENSE(F), and LICENSE(PR); in the meantime, LICENSE(σ) is decomposed into LICENSE-μ, LICENSE-μμ, and LICENSE-μμμ. In principle, the interaction of the parameterized set of the parse constraint LICENSE-SEG with the parameterized set of the antiparse constraint NONFINAL(σ), we argue, yields the correct stress patterns for all final syllables. A typological prediction of breaking NONFINALITY into a family of mora sensitive constraints avoids the need for parameterized extrametricality below the level of the foot. An explicit prediction is that mora extrametricality should not occur, i.e. no language should treat, for example, CVCC and CVV as heavy but treat CVC and CV as light, as we believe there are no compelling cases of mora extrametricality (for illuminating discussions, see Hayes 1995, Rosenthall & van der Hulst 1999)
Key words: Arabic; word stress, optimality theory, extrametricality; nonfinality.

1. Introduction

By adopting an optimality-theoretic account of stress (Prince and Smolensky 1993, McCarthy and Prince 1993a, b), the present paper situates the proposed analysis in the context of more traditional accounts to show, as Hayes (1982: 277) puts it, 'the simplicity behind systems that initially seemed complex'. Constraining the notion of extrametricality, we believe, helps support the claim that there can ONLY be syllable extrametricality.[1] Concisely, we argue that the OT successor of extrametricality NONFINALITY (Prince and Smolensky 1993, Hyde 2003) is intended to literally duplicate extrametricality effects. *NONFINALITY is then interpreted as banning the parsing of final syllables into the foot structure of the word, rather than simply banning the assignment of stress to these syllables, as is usually the case in OT analyses of metrical systems.*[2] To implement this analysis, it is necessary, we argue, to parameterize NONFINAL, such that we are in fact dealing with a family of markedness constraints that penalizes the footing of lighter final syllables more severely than the footing of heavier final syllables. The antiparse constraint NONFINALσ is then parameterized relative to syllable weight, resulting in NONFINAL-μ, NONFINAL-$\mu\mu$,, NONFINAL-$\mu\mu\mu$, and so on. The theoretical assumption is like this: a final syllable resists extrametricality as the weight of that syllable increases. Facts from some varieties of Arabic, including Modern Standard Arabic, support this typological investigation. Concisely, we present a relatively novel analysis for why light (σ_{μ}) and heavy ($\sigma_{\mu\mu}$) syllables, in contrast with superheavy ($\sigma_{\mu\mu\mu}$) syllables, are never stressed in final position in (almost) all varieties of Arabic, including Cairene (Crowhurst 1996), Palestinian (Abo-Salim 1980), Jordanian (Al-Jarrah 2002, Abo-Abbas 2003), and Saudi Arabic (Al-Mohanna 2005).[3]

By advancing the Strict Pairing Principle (SPP), we suggest a new typology of final weight demotion effects. Therefore, our analysis is extended to include Hindi (Prince 1980, Hayes 1991), Greek and Latin (Steriade 1988), Macedonian (Halle and Vergnaud 1987), Warao (Osborn 1966), Estonian (Prince 1980), Aguaruna (Hung 1994), Weri (Boxwell and Boxwell 1966 as cited in Kenstowicz 1994: 556), Winnebago (Hale and White Eagle 1980), Tùrbatulabal (Voegelin 1935 as cited in Kenstowicz 1994: 562), Maranungku (Tryon 1970b), Araucanian (Echeveria and Contreras 1965), etc.

2. Discussion

2.1 Extrametricality vs. nonfinality

Prince and Smolensky (1993: 42) assert that NONFINALITY is slightly different from extrametricality in that its focus is stress peaks. As a result, NONFINAL, the OT successor of extrametricality, is formulated along the

following lines:

NONFINAL *The prosodic head of the word does not fall on the word-final syllable*

Crowhurst (1996: 415) reproduces NONFINAL as:

NONFINAL *The final syllable of a PrWr is not stressed*

Hyde (2003: 1) makes a further slight departure in that the grid marks, not prosodic heads, represent stress, and thus the formulation of NONFINAL is slightly altered:

NONFINAL *No PCat1-level gridmark occurs over the final Cat of a PCat2*[4]

However, unlike Prince and Smolensky's (1993), Crowhurst's (1996), and Hyde's (2003) formulations, NONFINAL is intended here to be, to use Prince and Smolensky's (1993: 42) words, 'a general mechanism for achieving descriptive invisibility', i.e. to focus on the parsability of the final segment (be it the final foot, syllable or mora):

NONFINAL-SEG (μ, σ, F, PR) *The final (mora, syllable, foot or prosodic word) is not parsed into a higher prosodic structure*

This basically means that NONFINAL-SEG is an antiparse constraint *banning the parsing of final segment into the foot structure of the word, rather than banning the assignment of stress to these segments*; and thus its current formulation literally duplicates Hayes' (1995) linear formulations of foot, syllable, and consonant (and/or mora) extrametricality:

(1)
a. Foot extrametricality F → <F> / _____] word
b. Syllable extrametricality σ → <σ> / _____] word
c. Consonant extrametricality C → <C> / _____] word
d. Etc.

The following set of violable constraints is then universal:

(2) NONFINAL-SEG

NONFINAL(c) The final consonant is not parsed into the next higher prosodic constituent (i.e. the syllable)

NONFINAL(v) The final vowel is not parsed into the next higher prosodic constituent (i.e. the syllable)

NONFINAL(σ) The final syllable is not parsed into the next higher prosodic constituent (i.e. the foot)

NONFINAL(F) The final foot is not parsed into the next higher prosodic constituent (i.e. the prosodic word)

NONFINAL(PR) The final prosodic word is not parsed into the next higher constituent (i.e. the lexical word)

However, in order for extrametricality to be constrained to just syllable extrametricality, we advance the proposal that the antiparse constraint NONFINAL(σ), in particular, be further decomposed into a family of

sub-constraints. These include:

(3) NONFINAL(σ)

NONFINAL-V	A final V-syllable is not parsed into the next higher prosodic constituent (i.e. the foot)
NONFINAL-CV	A final CV-syllable is not parsed into the next higher prosodic constituent (i.e. the foot)
NONFINAL-CVC	A final CVC-syllable is not parsed into the next higher prosodic constituent (i.e. the foot)
NONFINAL-VV	A final VV-syllable is not parsed into the next higher prosodic constituent (i.e. the foot)
NONFINAL-CVV	A final CVV-syllable is not parsed into the next higher prosodic constituent (i.e. the foot)
NONFINAL-CVVC	A final CVVC-syllable is not parsed into the next higher prosodic constituent (i.e. the foot)
NONFINAL-CVCC	A final CVCC-syllable is not parsed into the next higher prosodic constituent (i.e. the foot)

By making use of the moraic structure of the syllable (see discussion below), the syllabic typology of all Arabic varieties can be reduced to three final syllable types differing in the weight of the syllable to which they apply:

(4)

NONFINAL-μ[5]	A final syllable consisting of one mora (namely NONFINAL-V and NONFINAL-CV) is not parsed into the next higher prosodic constituent (i.e. the foot)
NONFINAL-μμ	A final syllable consisting of two moras (namely NONFINAL-CVC, NONFINAL-VV, and NONFINAL-CVV) is not parsed into the next higher prosodic constituent (i.e. the foot)
NONFINAL--μμμ	A final syllable consisting of three moras (namely NONFINAL-CVVC and NONFINAL-CVCC) is not parsed into the next higher prosodic constituent (i.e. the foot)

The rationale behind splitting NONFINAL(σ) is that we need to make sure that at the foot formation level a final trimoraic syllable ($\sigma_{\mu\mu\mu}$) gets footed, and then passes on to the next level (stress projection level) - a state of affairs which requires parse constraints to dominate their antiparse rivals. In the meantime, a monomoraic syllable (σ_{μ}) and/or a bimoraic syllable ($\sigma_{\mu\mu}$) escapes footing altogether (i.e. becomes prosodically inert), and so gets filtered out prior to stress placement - a state of affairs which requires the opposite ranking (i.e. antiparse constraints dominate their parse rivals). One way to overcome this ordering paradox is to assume that NONFINALσ applies distinctively to final syllables, resulting in three universally ranked subconstraints as in (5) below:

(5) NONFINAL-σ (NONFINAL-μ >> NONFINAL-μμ >> NONFINAL-μμμ)

For stress placement purposes, a noteworthy of mention here is that a one-mora syllable and a two-mora syllable do not contrast in final position in (almost) all varieties of Arabic, suggesting that the contrast be between one-mora and two-mora syllables on one hand, and three-mora syllables on the other. For this parity to be motivated on crosslinguistic grounds, we put forward the following PAIRING principle, which states that in the ordered set (light, heavy, superheavy) groupings can only be made between adjacent members:

(6) Strict Pairing Principle: *A Constituent A pairs up with another constituent B iff it weighs plus or minus only one mora*[6]

What this basically means in probability terms is that if we have the set

$A = \{NONFINAL_{\mu_1}, NONFINAL_{\mu_1\mu_2}, ...,$

$NONFINAL_{\mu_1\mu_2....\mu_{i-1}}, NONFINAL_{\mu_1\mu_2....\mu_i}, NONFINAL_{\mu_1\mu_2....\mu_{i+1}}, ...,$

$NONFINAL_{\mu_1\mu_2....\mu_{N-1}}, NONFINAL_{\mu_1\mu_2....\mu_N}\}$

For some integer $N > 2$, then for any element $NONFINAL_{\mu_1\mu_2....\mu_i} \in A$, $1 < i < N$, we have either:

$\{(NONFINAL_{\mu_1\mu_2....\mu_{i-1}}, NONFINAL_{\mu_1\mu_2....\mu_i}), NONFINAL_{\mu_1\mu_2....\mu_{i+1}}\}$, or

$\{NONFINAL_{\mu_1\mu_2....\mu_{i-1}}, (NONFINAL_{\mu_1\mu_2....\mu_i}, NONFINAL_{\mu_1\mu_2....\mu_{i+1}})\}$.

Accordingly, the following typology then constitutes the final weight demotion effect for all languages:

(7) A. NONFINALμ, NONFINALμμ, NONFINALμμμ
B. NONFINAL≤μμ, NONFINAL>μμ
C. NONFINAL<μμ , NONFINAL≥μμ

In principle, NONFINAL-μμ may then end up in the same stratum with either NONFINAL-μ or NONFINAL-μμμ; but we never expect NONFINAL-μ to pair up with NONFINAL-μμμ (to contrast with NONFINAL-μμ, for example). We hope to show that this analysis is, in addition to generating the simple stress patterns (e.g. Latin, Macedonian, Warao, Tùrbatulabal, Weri, Winnebago, Ojibwa) in a straightforward fashion, robust enough to account for the more complex ones (e.g. Estonian, Arabic, Maranungku, Araucanian).[7] In this paper, we advance the claim that (almost) all varieties of Arabic, which are the primary empirical focus of this paper, fit into (7b) above. The typology is then as follows:

(8) NONFINAL≤μμ >> NONFINAL>μμ
NONFINAL≤μμ *A final syllable that weighs two moras or less*

	must not be parsed into a higher prosodic structure
NONFINAL>μμ	A final syllable that weighs more than two moras must not be parsed into a higher prosodic structure

2.2 Moraic structure of the syllable

Constraining extrametricality to syllable extrametricality involves trimoraicity. This claim challenges the bimoraic limit of syllables and feet advanced in almost all OT- and pre-OT-approaches to stress and the syllable in Arabic (e.g. Broselow 1992, Kiparsky 2003). The controversy has its roots in pre-optimality literature. Selkirk's (1981) Exhaustive Syllabification principle and Ito's (1986, 1989) Prosodic Licensing principle require the association of every segment with a higher-level prosodic constituent. According to Hayes (1989: 258), the Weight by Position rule states that postvocalic consonants must be parsed as moraic. The claim has made its way through into OT accounts of stress and the syllable. Broselow (1997: 64) formulates the Weight by Position constraint as 'All coda consonants must be dominated by a mora'. Kager (1999: 147) puts it as 'Coda consonants are moraic'. Hyde (2003: 8) reproduces the Weight by Position as 'Every coda consonant is associated with a mora'. When investigating the behavior of closed syllables, Rosenthall & van der Hulst (1999), however, provide intriguing argument that the weight of closed syllables is context dependent. To them, 'closed syllables are light, but contextually heavy to satisfy some higher ranking constraint and (2) closed syllables are heavy, but are contextually light for the same reason' (Rosenthall & van der Hulst 1999: 499). The theoretical inquiry in the present study concerns the association of the third mora of a trimoraic trochee: To which constituent (syllable, foot, or prosodic word) should it be adjoined?

Under the current proposal, we put forward the claim that there are some higher ranking constraints that force violation of FOOTBINARITYμ as a constraint on foot size, and so its violation never results in sub-optimal forms in the varieties of Arabic under discussion. Concisely, we argue that the parse constraint LICENCE(μ), which requires a mora to be associated with the next-higher prosodic constituent (namely the syllable), outranks FOOTBINARYμ – a claim that runs counter to (almost) all proposals regarding the interaction of LICENCE(μ) with FOOTBINARYμ. For example, Crowhurst (1996), Watson (2007: 377) and Kiparsky (2003) provide some repair mechanism to avoid violating FOOTBINARITYμ. They argue that the extra mora (of a trimoraic trochee, for example) is associated with the prosodic word which is not subject to size restrictions. To them, a parse such as *(kaa)(saa)<t>* 'drinking vessels' would best *(kaa)(saat)*. However, unlike

Crowhurst's (1996), Kiparsky's (2003), and Watson's (2007) proposal, we advance an optimality-theoretic version of the Strict Layering requirement where the locus of adjunction is immediate (for details see Nespor and Vogel 1986: 7).[8] In gross terms, we capitalize on the following claims: (1) LICENSE-SEG applies distinctively (LICENSE(μ), LICENSE(σ), LICENSE(F) and LICENSE (PR)), and (2) the locus of adjunction is immediate as in (9) below:

(9) LICENSE-SEG

LICENSE(μ)	*every mora must be adjoined to the next-higher prosodic constituent (i.e. the syllable)*
LICENSE(σ)	*every syllable must be adjoined to the next-higher prosodic constituent (i.e. the foot)*
LICENSE(F)	*every foot must be adjoined to the next-higher prosodic constituent (i.e. the prosodic word)*
LICENSE(PR)	every prosodic word must be adjoined to the next-higher constituent (i.e. the lexical word)

Like NONFINAL(σ), LICENSE(σ) can also be factored out into: LICENSE-μ, LICENSE-μμ, LICENSE-μμμ:

(10) LICENSE(σ) (LICENSE-μ, LICENSE-μμ, LICENSE-μμμ)

LICENSE-μ[9]	*a syllable consisting of one mora is parsed into the next higher prosodic constituent (i.e. the foot)*
LICENSE-μμ	*a syllable consisting of two moras is parsed into the next higher prosodic constituent (i.e. the foot)*
LICENSE-μμμ	*A syllable consisting of three moras is parsed into the next higher prosodic constituent (i.e. the foot)*

The mating of the two (antagonistic) families (namely LICENSE-SEG and NONFINAL-SEG) should, we argue, yield the optimal stress patterns on final syllables for all languages. Given the proposal that the multiple constraints of NONFINAL-σ are universally ranked (i.e. NONFINAL-μ >> NONFINAL-μμ >> NONFINAL-μμμ), the ranking possibilities of LICENSE-SEG relative to the parameterized set of NONFINAL-σ are:

A. LICENSE-SEG dominates NONFINAL-μ, NONFINAL-μμ and NONFINAL-μμμ. (The final syllable, irrespective of its quantity, is always stressed)
B. LICENSE-SEG is only dominated by NONFINAL-μ (Heavy and superheavy are stressed in final position)
C. LICENSE-SEG is dominated by NONFINAL-μ and NONFINAL-μμ (Only superheavy syllables are stressed in final syllable)
D. LICENSE-SEG is dominated by NONFINAL-μ, NONFINAL-μμ and NONFINAL-μμμ (A final syllable, irrespective of its quantity, is never stressed)

2.3 Extrametricality in Arabic

Several treatments have been proposed to account for how superheavy ultimas are stressed (for Arabic see Halle & Vergnaud 1987a, Hayes 1979, 1982, 1991, 1995, McCarthy 1979a, 1979b, Al-Mozainy et al. 1985, Broselow 1992, 1997, Hung 1993, 1994, Crowhurst 1996, Kiparsky 2003, among others; for English see Hayes 1981, 1982; for Romance see Harris 1983; for Greek see Steriade 1988).[10] Hayes (1991: 47) proposes that extrametricality 'designates a particular constituent as invisible for the purposes of creating metrical structure'. And one of the restrictions on extrametricality is constituency in that 'only constituents (e.g. segment, mora, syllable, foot, phonological word) may be marked as extrametrical' (Hayes 1991: 47).[11] Crowhurst (1996: 416), following McCarthy (1979a), argues for treating final Cs in trimoraic ultimas as degenerate feet - a repair mechanism to avoid violating NONFINAL and FOOTBINARITYμ.[12] This echoes the traditional claim put forward by Al-Mozainy, Bley-Vroman, & McCarthy's (1985: 140) that a light syllable projects a nonbranching rhyme and a heavy syllable projects a branching rime, but a superheavy syllable projects a sequence of a branching and nonbranching rhymes. Their argument is like this: the final rime (irrespective of its weight load) is extrametrical, 'adjoined as a weak sister to the immediately preceding foot'. Less obviously, Hayes (1982: 229) argues, 'word-final syllables are demoted one position down the hierarchy of syllable weight: superheavy syllables are treated as heavy, while heavy syllables are treated as light'. Hung (1993: 2) asserts that '…in all dialects of Arabic CVC is heavy everywhere except at the end of the word'. For Greek recessive stress, Steriade (1988: 276) postulates a comprise mechanism in that a 'final consonant is extrametrical' and a 'final light syllable is extrametrical', too, echoing the requirement advanced by Harris (1983) that segment extrametricality and syllable extrametricality be kept as distinct options. In Kiparsky's (2003: 157) terms, the final C is weightless, and thus NONFINAL(C) is undominated. For two constituents to be dominated by one mora, Watson (2007: 351) makes use of Broselow's (1992) Adjunction-to-Mora reformulated as NOSHARED MORA. By advancing a ranking argument between FOOTBINARITY and NOSHARED MORA, Watson argues that the typological stress patterns are accounted for (See Watson's Tables 11a & b). Rosenthall & van der Hulst (1999) argue for extending correspondence constraints to weight: a closed syllable in a language like Arabic then surfaces monomraic because *μ/CON (no moraic coda consonants) outranks *APPEND (no nonmoraic syllable appendix), but a closed syllable in Latin, for example, surfaces bimoraic by reversing the relative ranking of the same two constraints.

A noteworthy of mention here is that almost all previous treatments have shown the need to advance new constraints (e.g. NOSHARED MORA) to

account for final weight demotion effects. However, given standard constraints, we aim to show that by following the basic tenant of an OT analysis, final stress variation is reduced to constraint ranking.

Compared with the more traditional approach that assumes final consonant extrametricality (see McCarthy 1979a, b, Ito 1986, 1989, Borowsky 1986b, Halle and Vergnaud 1987a, Hung 1993), the proposed analysis advances the claim that *it is always the final syllable* that should be considered extrametrical.[13] The argument is like this: stress placement (or lack thereof) on final syllables (irrespective of their intrinsic prominence) can be an effect of parsability: the requirement to parse a trimoraic syllable ($\sigma_{\mu\mu\mu}$), for example, is more compelling than the requirement to parse a bimoraic syllable ($\sigma_{\mu\mu}$), and so on. In optimality-theoretic terms, parsing a three-mora syllable is sanctioned by a sub-constraint that does not sanction a two-mora syllable, and so on. The novel insight in this proposal is that the pressure to parse a syllable (i.e. LICENSEσ) increases as the weight of the syllable increases. Conversely, the pressure not to parse a syllable (i.e. NONFINALσ) decreases as the weight of that syllable increases. Parsing a syllable, irrespective of its position, is largely determined by its weight: the heavier the syllable is, the more likely it gets parsed. What this basically means is that *the weight of the syllable is only relevant at the foot formation level, but is totally irrelevant at the stress projection level*. Concisely, stress placement on final syllables is reduced to mora count. All in all, the presence (or lack thereof) of stress on the final syllable is a function of the gross syllabification of the entire word, i.e. where exactly parameterized LICENSE-SEG (relative to parameterized NONFINALσ) is interleaved in the hierarchy.

By decomposing the antiparse constraint NONFINALσ into a family of subconstraints differing in the weight of the syllable to which they apply, we eliminate (once and for all) consonant and (presumably) foot extrametricality. We will shortly show how this analysis, on the one hand, accounts for the final weight demotion effects in (almost) all varieties of Arabic, i.e. the stresslessness of light (σ_{μ}) and heavy syllables ($\sigma_{\mu\mu}$) in final position (For discussion see McCarthy 1979b, Al-Mozainy et. al. 1985, Hayes 1995), and how it still accounts for the prominence of superheavy syllables ($\sigma_{\mu\mu\mu}$) in that same position, on the other.

Another big advantage why we choose to constrain extrametricality to syllable extrametricality over the more traditional consonant extrametricality is the widely accepted notion of syllable integrity (Prince 1976, Prince and Smolennsky 1993, Blevins 1995, Hayes 1995, Crowhurst 1996). Following Prince and Smolensky (1993: 28) and Hayes (1995: 49), we assume that syllable integrity is, at least for purposes of stress

assignment, inviolable, i.e. the prosodic hierarchy is strictly layered. Hence, for stress languages like Arabic, 'the stress-bearing unit is the syllable' (Hayes 1995: 49). Feet boundaries do not then fall within syllables, disallowing feet to be constructed over sub-syllabic units.[14] Contrary to probably all previous claims about (almost) all varieties of Arabic (e.g. Kenstowicz and Abdul-Kareem 1980, Kenstowicz 1983, Hayes 1995, Broselow et al. 1992, Broselow 1997, Kiparsky 2003, Watson 2007), the present analysis advances a typological argument that they are not quantity-sensitive languages, i.e. syllable position (not syllable weight) is the most crucial factor in at the stress projection level.[15]

2.4 Dialectal variation

Before letting ourselves into showing how mora-sensitive parse and antiparse constraints rank relative to each other at the rightmost edge of the lexical word, we hope to settle two disputes about the syllable weight typology of Arabic. At the level of detail we are considering here, significant differences are reported in the literature between the High and the Lower varieties of Arabic as far as syllable weight is concerned.[16] These include: (1) the weight of a nonfinal CVVC; and (2) the weight of a final stressed CVV.

2.4.1 Nonfinal CVVC

The prosodic difference between CVVC and CVCC is evident in a number of Arabic dialects (See Fischer 1969, Aoun 1979, Selkirk 1981, Broselow 1992, Broselow et al. 1995, Broselow et al. 1997, Kiparsky 2003, and Watson 2007, among others). For example, whereas CVCC syllables are rarely attested word-internally (e.g. gilt.lu 'I told him' in the western Maghribi dialects), CVVC syllables are attested word-internally in derived environments. Examples include *laa.bis + iin > laab.siin* 'wearing', *xaal + hum > xaalhum* 'their uncle', and *saa.fir + u > saaf.ru* 'they travelled' (Saudi, Jordanian, Palestinian, Sudanese, etc.).[17] According to Watson (2007: 340), these are only sanctioned in VC and C dialects, but are never sanctioned in CV dialects of Arabic.[18]

To account for this typological state of affairs, Watson (2007: 340) argues that the third mora of the penult in words like *baab.ha* 'her door', *saaf.ru* 'they traveled', *laab.siin* 'wearing', *and xaalhum* 'their uncle' is licensed as a semisyllable associated with the prosodic word (like the final mora or a final trimoraic trochee in Crowhurst 1996, Broselow et al 1995, Broselow et al.1997). Shielded with some instrumental findings, Broselow et al. (1995) argue that the long vowel of nonfinal CVVC is significantly shorter than that of CVV. Accordingly, CVVC penults, they argue, are in fact bimoraic. Under our current proposal, we specifically follow this insight:

NONFINAL-CVVC is bimoraic, resulting in the following syllable weight typology:

position	weight	Trimoraic (μμμ,)	Bimoraic (μμ),	Monomoraic (μ)
In final position		CVCC, CVVC	CVV, CVV	CV
In nonfinal position		CVCC	CVVC, CVV, CVC	CV

Table 1. Weight typology of CVVC

In terms of syllable quantity, what this basically means is that whereas CVVC pairs up with CVCC in final position, it clusters with CVV and CVC in nonfinal position.

2.4.2 Final stressed CVV

In contrast, a final stressed CVV, we argue, is trimoraic. To illustrate, CVC and CVV are not prosodically equivalent in many dialects of Arabic, either. Whereas a final CVV is not stressed in Classical and Modern Standard Arabic (Cf. RA'aa 'he saw'; GAAluu 'they said'), it carries primary stress in Egyptian, Levantine and the Yemeni dialect of Sanɔ̄a (Cf. *šaFUU* 'they saw him' and qaaLUU 'they said it') (see McCarthy 1979b: 446, Welden 1980: 102, Broselow et al. 1995, Broselow et al. 1997).

The problem, we reckon, is that most studies have not as yet drawn a line of demarcation between a final unstressed CVV in Classical and Modern Standard Arabic and a final stressed CVV in some Arabic vernaculars. Historically, a final stressed CVV in (almost) all Arabic vernaculars is a reduced form of a CVVC syllable type. Consider the following two Levantine Arabic examples reported in Broselow et al. (1997: 56) from Cowell (1964): *da.rasTUU* 'you (PL) studied it (MAS)' and *da.RAS.tu* 'You (PL) studied'. Whereas the former is historically a derived form of *da.ras.tuuh* (daras + tuu +h), the latter is a derived form of da.ras.tuu (daras + tuu). In Classical and Modern Standard Arabic, there are in fact the following three forms:

(11) A. daRAStu 'I (SING) studied'
B. daRAStuu 'You (PL) studied'
C. darasTUUH 'You (PL) Studied it (MAS)'[19]

The crux of the matter is like this: the final syllable of *darasTUUH* is heavier than *daRAStuu* which in turn is heavier than *daRAStu*. The interesting point is that although the post-vocalic /h/ of *darasTUUH* drops in some Arabic vernaculars (e.g. Egyptian), stress continues to terminate on the final syllable (Cf. *darasTUU*).[20] In the mind of the native speakers of Arabic, the weight demotion effect of *'darasTUU'* is then already respected by having that post-vocalic /h/ (whose semantic load is still evident to distinguish it from

'da.RAS.tuu 'You (PL) studied') drop altogether. In phonological terms, although post-vocalic /h/ drops altogether, its weight continues to be effective for stress placement purposes. The final stressed CVV in Egyptian, Levantine, etc. is principally a trimoraic trochee. Therefore as far as the intrinsic prominence of CVV is concerned, the present study advances the claim that *a reduced CVV(c) is trimoraic*.

We make use of this typological observation to keep the line of demarcation between mora extrametricality NONFINAL(μ) and consonant extrametricality NONFINAL(C) - a nontrivial challenge for the semisyllable, degenerate foot and No shared Mora analyses. Whereas mora extrametricality makes CVVC and CVCC stressable in final position but CVV, CVC and CV unstressable, consonant extrametricality makes CVVC, CVCC and CVV stressable in final position but CVC and CV unstressable. Under this assumption, Modern Standard Arabic (Like Classical Arabic) is a case of mora extrametricality (so as to avoid stressing CVV in final position, but Cairene and the Yemeni dialect of Sanɔa, for example, are cases of consonant extrametricality (so that CVV is stressed but CVC is not).

Our uniform analysis which calls for factoring out NONFINALITY presents a typological evidence for this parity of CVV syllables. We basically distinguish between CVV(C), which is a reduced form CVVC, and nonreduced CVV. Reduced CVV(c) pairs up with CVVC and CVCC, and gets stressed in final position in some varieties of Arabic (e.g. Egyptian *šaFUU*); but a nonreduced CVV pairs up with stressless CVC in all varieties of Arabic.[21] In OT terms, what this basically means is that CVV(c) falls in the same stratum along with CVVC and CVCC in some Arabic vernaculars, but CVV is outweighed by CVVC CVCC, and CVV(c):

Trimoraic (μμμ)	Bimoraic (μμ)	Monomoraic (μ)
CVCC, CVVC, CVV(c)	CVV, CVV	CV

Table 2. Weight of CVV(c) and CVV

2.5 Data

In order to get authentic data, the present study (almost) reduplicated the main methodology used in Broselow et al. (1995). By conducting a field experiment, we aimed to avoid at least two major design and analytical problems. First, it is probably undisputed fact that "there is no pandialectal tradition for stressing Classical Arabic" (McCarthy 1979b: 446). It could therefore be a design an analytical flaw to make generalizations about a dialect whose stress system is still disputable. Second, differences between the stress systems of almost all the dialects of Arabic are never trivial. For, some lower varieties of Arabic (e.g. Jordanian, Levantine, Iraqi, Saudi Arabic, etc.) have undergone some radical changes as far as word stress is

concerned. The data we obtained from the field experiment we conducted then represent the language which most native speakers of Arabic (irrespective of the variety they speak) would consider as Modern Standard Arabic (henceforth MSA).

2.5.1 Subjects

Five informants (3 females and two males) who were natives of Jordanian Arabic were asked to read twenty target words onto a CD in a language-equipped laboratory. We chose all of our informants to be holders of at least the BA degree in Arabic Language and Literature. And two of them were enrolled in the PhD program at Yarmouk University. The reason was that we wanted to make sure that they are well-educated people who know how to use Modern Standard Arabic**.**

2.5.2 Procedure

Unlike Broselow's (1995), the researcher this time reviewed the example sentences with the experimenters in their low-forms (Jordanian Arabic), and then asked them to re-produce them in Modern Standard Arabic forms, as they would do on a TV news program, for example. Each target word was embedded in two carrier sentences, so there were 10 tokens for each target word (2 occurrences x five repetitions). Their readings were tape-recorded on a CD to be manipulated for the perception experiment.

2.5.3 Perception of Stress

A relatively modest perception experiment was conducted. The target words were decontextualized in that only the target words were made audible to two phonetically experienced native listeners. The listeners were instructors of Arabic at Yarmouk University. They are PhD holders of Arabic language, and they teach Arabic to Nonnative speakers in the Language Center at Yarmouk University. On the whole, they have had the knowledge and the experience on how evaluate the suprasegmentals of spoken tokens. The researcher asked them to listen to each token as many times as they would want so as to identify the syllable on which main word stress falls as produced by the subjects. The researcher then subcategorized their evaluations; cases of uncertainty were ignored.

2.5.4 Findings and analysis

Their evaluations have been subcategorized as in (12) below:

(12) A. ħimaar, masaakiin, baabayn, almu?minuun, dukkaan, kalb, katabt, laðibt

B. madaaris, Talabaatun, Taalibaatun, rajaðna, sajaratun, maktabah, mar□aba,

muðallimah

C. rasama, šajarah, maraqah, šajaratuhu, midrasatuh, ?adwiyatuhumaa[22]

Given the referee's evaluations of the main stress patterns, it has turned out that Langendoen's (1968: 102) stress rules account for the data:

(13)

1. 'Main word stress falls on the last syllable of the word iff (if and only if) it is superheavy', i.e., /cvcc/ or /cvvc/ (e.g. kalb, kilaab, kaTABT*, ħimaar, dukKAAN, baBEEN,* ħasaNEIN, sakaKIIN etc.)[23]
2. 'If the final syllable is not superheavy, stress goes to the penult if it is heavy', i.e., /cvc/ or /cvv/ (e.g maDAAris, TalaBAAtun, raJAðna, BEItak, ðaMILta, maKAAtib*, kaTABna, muDARris,* etc.)
3. 'If the final syllable is not superheavy, and if the penult is not heavy, stress falls on either the penult or the antepenult whichever is separated from a preceding heavy syllable (or word boundary) by an even number of light syllables, including zero' (e.g., RAsama*, KAtaba, makTAbah (makTAba), marĦAba, muxTAlifa, midRAsatuh (midRAsatu), kataBAtaa, ŠAjarah, ŠajaRAtuhu, ?adwiyaTUhumaa*, ?Abadan etc.)

3. A constraint-based analysis

The core proposal under consideration in this paper is that extrametricality phenomena in stress systems are better analyzed, in Optimality-Theoretic terms, by a constraint NONFINALITY that is interpreted as *banning the parsing of final syllables into the foot structure of the word, rather than simply banning the assignment of stress to these syllables*, as is usually the case in OT analyses of metrical systems. To implement this analysis for some dialects of Arabic, NONFINALσ is parameterized into a family of markedness constraints that penalizes the footing of lighter final syllables more severely than the footing of heavier syllables.

It has already noted that by applying the Weight by Position rule (Hayes 1989: 258) or its OT equivalent Coda/μ (Broselow et al. 1997: 44, Kager 1999: 147, Hyde 2003: 8), Modern Standard Arabic (as well as other varieties) then recognizes (grossly speaking) three degrees of intrinsic prominence: monomoraic (μ), bimoraic (μμ) and trimoraic (μμμ) (For discussion see Mitchell 1960, Langendoen 1968, Brame 1971, 1973, 1964, McCarthy 1979b, Hayes 1995), resulting in a heaviness scale similar to that suggested by Prince and Smolensky (1993: 41) for Hindi:

(14) |μμμ| > |μμ| > |μ|

The moraic structure of almost all varieties of Arabic makes imperative that trimoraic syllables in final position be stressed; meanwhile, mono- and bimoraic syllables surface unstressed in that position. Consider:

(15) a. Final stressed |μμμ| mu.dar.ri.SAAT (female teachers)
kaTABT (I wrote)
b. Final unstressed |μμ| mu.Tal.LA.gah, (a divorcee)
?ad.wi.ya.TU.hu.maa (their medicine)
c. Final unstressed |μ| Muṣ.Ta.fa (proper name)[24]

Given the proposal that the final syllable is always extrametrical, our inquiry then concerns how stressing a trimoraic syllable in final position can be accounted for. The proposal we advance here is that a final trimoraic syllable is stressed because it is the optimal parse derived by the interaction of all mora-sensitive parse (LICENSE-SEG) and anti-parse (NONFINAL-σ) constraints. In the following subsections, we present an OT basic analysis for antepenult, penult and ultimate stress for some varieties of Arabic.

3.1. Antepenult stress

In many varieties of Arabic, stress terminates on a light antepenult that is separated from a preceding heavy syllable or the leftmost boundary of the word by an even number of light syllables (including zero) provided that the ultimate is not superheavy and the penult is not heavy. Concisely, for stress to surface on a light antepenult, the three-syllable window is either **/CV**.CV.CV/ or **/CV.**CV.CVC/ as in **sa**raqa, mid**ra**satu, **ma**ragah, mux**ta**lifah, ?adwiya**tu**humaa, etc. The proposal that LICENCE-σ (namely LICENSE-μ and LICENSE-μμ) should be dominated by NONFINAL≤μμ yields, we argue, the correct stress patterns as demonstrated in Tables (1-4) below.

A. **/CV**.CV.CV/

Input: / RAsama / MSA 'he musc. paint past' *he painted*	NF≤μμ	LICE-μ	LICE(μ)	FB-μ
a-☞ (RAsa)ma		*	*	
b- (rasa)(MA)	*!			*

Table 1. Stressing a light penult separated from left-most boundary by zero syllable, e.g. /**CV**.CV.CV/

Input: /midrasatu/ Jordanian 'his MAS. school' *His school*	NF≤μμ	LICE-μ	LICE(μ)	FB-μ
a-☞ (mid)(RAsa)tu		*	*	
b- (mid)(rasa)(TU)	*!			*

Table 2. Stressing a light penult separated from a preceding heavy syllable by zero syllables, e.g. /CVC.**CV**.CV.CV/

B. /**CV.**CV.CVC/

Input: /ma.ra.qah/ Jordanian 'soup FEM' *soup*	NF≤μμ	LICE-μμ	LICE(μ)	FB-μ
a-☞ (MAra)qah		*	**	
b- (mara)(QAH)	*!			

Table 3. Stressing a light penult separated from left-most boundary by zero syllables, e.g. /**CV**.CV.CVC/

Input: /mux.ta.li.fah/ MSA 'different FEM' *different*	NF≤μμ	LICE-μμ	LICE(μ)	FB-μ
a-☞ (mux)(TAli)fah		*	**	
b- (mux)(ta.li)(fah)	*!			

Table 4. Stressing a light penult separated from a preceding heavy syllable by zero syllables, e.g. /CVC.CV.CV.CVC/

3.2. Penult stress

In (almost) all the varieties of Arabic under consideration, stress terminates on the penult in two cases: (1) it surfaces on a heavy penult when the final syllable is not superheavy (e.g. kiTAAbi, madaRIShum); and (2) it surfaces on a light penult that is separated from a preceding heavy syllable or the leftmost boundary of the word by an even number of light syllables (including zero) provided that the final syllable is not superheavy (e.g. marHAba, makTAbah). The three-syllable window then looks like: CV**CVC**CV, CV**CVC**CVC, CVC**CV**CV, CVC**CV**CVC.

Input: /kitaabi/ *my book*	NF≤μμ	LICE-μ	LICE(μ)	FOOTBINARITY-μ
a- ☞(ki)(TAA)bi		*	*	*
b- (ki)(taa)(BI)	*!			**

Table 5. Stressing a heavy penult when the final syllable is not heavy, e.g. /CV**CVC**CV/

Input: /Talabaatun/ *application forms*	NF≤μμ	LICE-μμ	LICE(μ)	FOOTBINARITY-μ
a- ☞ (tala)(BAA)tun[25]		*	**	
b- (ta)(LAbaa)tun		*	**	*!*
c- (TAla)baatuun		**	**!**	
d- (tala)(baa)(TUN)	*!			

Table 6. Stressing a heavy penult when the final syllable is heavy, e.g. /CVCV**CV**CCVC/

Input: Jordanian Arabic /mar.ʕa.ba/ *Hello*	NF≤μμ	LICE-μ	LICE(μ)	FOOTBINARITY-μ
a- ☞(mar)(ḤA)ba		*	*	*
b- (mar)(ha)(BA)	*!			**

Table 7. Stressing a light penult when the final syllable is not heavy, e.g. /CVC**CV**CV/

Input: Jordanian Arabic /maktabah/ *library*	NF≤μμ	LICE-μμ	LICE(μ)	FOOTBINARITY-μ
a- ☞ (mak)(TA)bah		*	**	*
b- (mak)(ta)(bah)	*!			*

Table 8. Stressing a light penult when the final syllable is heavy, e.g. /CVC**CV**CVC/

All in all, one-mora (σ_{μ}) and two-mora ($\sigma_{\mu\mu}$) syllables surface stressless in final position by having NONFINAL$\leq_{\mu\mu}$ dominate LICENSE-σ (LICENSE-μ and LICENSE-μμ) as in (16) below, so that they escape footing altogether, and thus become prosodically inert:

(16) Constraint Ranking: NONFINAL $\leq_{\mu\mu}$ >> LICENSE-μ, LICENSE-μμ

3.3 Ultimate Stress

On the other hand, a final syllable is stressed iff (if and only if) it is superheavy ($\sigma_{\mu\mu\mu}$). We claim that a three-mora syllable (e.g. Ta.li.baat) receives main word-stress in final position due to the suggestion that LICENSE-$_{\mu\mu\mu}$ dominate NONFINAL>$_{\mu\mu}$ as in (17) below:

(17) Constraint Ranking: LICENSE- $_{\mu\mu\mu}$ >> NONFINAL>$_{\mu\mu}$

Given this constraint ranking, table (9) below shows how the actual output

form wins the competition:

Input: /Talabaat / 'application forms'	NF≤μμ	LICE- μμμ	LICE(μ)	NF>μμ	FB-μ
a- ☞ (Tala)(BAAT)				*	*
b- (TAla)baat		*!	***		

Table 9. Stressing a final three-mora syllable

Unlike probably all previous proposals, our analysis makes clear that LICENCE-μμμ forces violation of FOOT-BINARITYμ; the parse *(Tala)(BAAT)* bests *(Tala)(BAA)t*, where the final segment is extraprosodic. In the meantime, LICENSE(μ) (which requires a mora to be parsed into the next higher prosodic constituent, namely the syllable) is higher ranking because the locus of adjunction is immediate.

Input: /Talabaat / 'application forms'	NF≤μμ	LICE-μμμ	LICE(μ)	NF>μμ	FB-μ
a-☞ (Tala)(BAAT)				*	*
b- (TAla)baat		*!	***		
c- (Tala)(BAA)t		*!	*		

Table 10. Stressing a final three-mora syllable

Again, the ranking of LICENSE-SEG (LICENSE-μμμ and LICENSE(μ)) relative to NONFINALσ (NONFINAL≤μμ and NONFINAL>μμ) accounts for how trimoraic syllables (σμμμ) become potential carriers of main word stress in final position, but mono- and bimoraic syllables (σμ , σμμ) do not. The final ranking of the parameterized parse constraint LICENSE-SEG relative to the parameterized unparse NONFINAL-SEG is as follows:

(18) NONFINAL ≤μμ >> LICENSE-μμμ, LICENSE-μμ, LICENSE-μ, LICENSE(μ) >> NONFINAL>μμ

3.4. Dialectal variations

As far as Arabic stress patterns are concerned, our final inquiry concerns optimizing stress for vernacular forms like /šafuu/ and /xaalhum/, where the ultimate and the penult syllables are stressed respectively. As for /šafuu/ (they saw it), it has already been shown that the final syllable is a reduced form of CVVC syllable type and is principally trimoraic (see 2.4b above). For, /šafuu/ *'they saw it'* contrasts with /šafuu/ *'they saw'* whose final syllable

is only bimoraic. Tables (11 & 12) below show how the actual forms win the competition:

Input: /šafuu/ (they saw)	NF≤μμ	LICE-μμ	LICE(μ)	NF>μμ	FB-μ
a-☞ (ŠA)fuu		*	**		*
b- (ša)(FUU)	*!				*

Table 11. Nonreduced final CVV is bimoraic

Input: /šafuu / (they saw it)	NF≤μμ	LICE-μμμ	LICE(μ)	NF>μμ	FB-μ
a-☞ (ša)(FUU)				*	*
b- (ŠA)fuu		*!			*

Table 12. Reduced final CVV is trimoraic

Accordingly, whereas (11b), whose final footed syllable weighs two moras, loses competition because it incurs a violation of NF≤μμ, (12a) surfaces as the actual output form because its final footed syllable weighs three moras, and so no violation of NF≤μμ is incurred.

/xaalhum/ can also be accounted for in a similar fashion. Based on the findings of some previous research (Broselow et al. 1995), we have argued that a nonfinal CVVC (in contrast with a final CVVC) is bimoraic. Table (13) below shows how the subconstraints ranking in (16) above can also handle this case in a somewhat elegant fashion:

Input: /xaalhum/ Their uncle	NF≤μμ	LICE-μμ	LICE(μ)	NF>μμ	FB-μ
a-☞ (XAAL)hum		*	**		
b- (xaal)(HUM)	*!				

Table 13. Nonfinal CVVC is bimoraic

4. Final-weight demotion effects

4.1 Crosslinguistic typology

The suggestion that two-mora syllables (σ-μμ) pair up with one-mora syllables (σ-μ) at word-end is cross-linguistically evident. The ranking argument established in (13) above is motivated on universal grounds. Consider the following cases from Estonian prosody (Prince 1980; Hayes 1991):

(19) (a) **ka**va*latt*
pa.he.*mai*t (bold primary; italics secondary)
(b) **pi**mestav
retelile

Apart from the intricacies of the subject matter, Prince (1980: 512) asserts that a stressed syllable in final position 'will contain a Q3 segment' as in (14a) in contrast with (14b) above. What this basically means is that, like (almost) all varieties of Arabic, the contrast in final position is between one-mora and two-mora syllables on the one hand, and three-mora syllables on the other. Hence Estonian, like Arabic, distinguishes between two and greater than two moras. In terms of constraint ranking, LICENCE-SEG is then interleaved between NONFINAL$\leq_{\mu\mu}$ and NONFINAL$>_{\mu\mu}$ as in (17) above, so that (**ka**va)(*laat*) bests (**ka**va)latt, (**pi**me)stav bests (**pi**me)(*stav*) and (**re**te)(*li*)le bests (**re**te)(*li*le).

(20) Constraint ranking I: NONFINAL $\leq_{\mu\mu}$ >> LICENSE-SEG >> NONFINAL$>_{\mu\mu}$
Basic pattern I Estonian, Classical Arabic, Modern Standard Arabic, Jordanian, Egyptian, etc.

If, however, the contrast in final position is between one (σ-μ) and greater than one mora (σ-μμ & σ-μμμ), the ranking would then be something like (21) below:

(21) NONFINAL<μμ >> NONFINAL≥μμ

As far as stress placement is concerned, the interesting cross-linguistic observation is that the paring of two-mora syllables with three-mora syllables at word-end is strikingly lacking, especially for main stress.[26] In other words, the distinction between one and greater than one mora at word-end is rarely attested. According to Kager (1993a), Finish, Estonian, Czech, 'display some quantity-sensitivity'. For example, although main stress in Finnish is invariable (as it always falls on the first syllable), secondary stress (which never falls on the second syllable irrespective of its weight) shows some variability and is conditioned by syllable weight, especially to resolve the conflict between penult and ultimate secondary stress. Estonian, Czech, etc. display similar phenomena. Therefore, the constraint ranking in (22) below is typologically attested:

(22) Constraint ranking II: NONFINAL<μμ >> LICENSE-SEG >> NONFINAL≥μμ
Basic pattern II Finish, Estonian, Czech, etc.

Grossly speaking, when final two-mora syllables (σ-μμ) surface stressed in final position, languages (e.g. Maranungku, Araucanian, etc.) typically tend to distribute stressed and unstressed syllables in an alternating fashion (for a detailed discussion see Hayes 1981), resulting in stressing (or

unstressing) a final syllable irrespective of its intrinsic prominence as in (23) below:

(23) **Maranungku** (Tryon 1970b): Primary stress falls on the initial syllable, and secondary stress falls on every other syllable thereafter (irrespective of its intrinsic prominence), resulting in the following stress contours: **CV**CV, **CV**CV*CV*, etc.
Araucanian (Echeveria and Contreras 1965): Main stress falls on the second syllable and secondary stress falls on every other syllable thereafter (irrespective of its intrinsic prominence, resulting in the following stress contours**:** CV**CV**, CV**CV**CV, CV**CV**CV*CV*, etc.

In terms of constraint ranking, what this basically means is that LICENSE-SEG and NONFINAL-σ do not rank relative to each other as in (24) below:

(24) Constraint ranking III: NONFINAL<μμ , NONFINAL≥μμ , LICENSE-SEG
Basic pattern III Maranungku, Araucanian, etc.

Finally, when the multiple constraints of NONFINAL-σ (namely NONFINALμ, NONFINALμμ, and NONFINALμμμ) do not pair, resulting in the following three universally ranked subconstraints:

(25) NONFINALμ >> NONFINALμμ >> NONFINALμμμ

This is probably the most straightforward case as LICENSE-SEG cannot be interleaved; it has to fall either to the rightmost or to the leftmost of the parameterized set of NONFINAL-σ as in (26 & 27) below:

(26) NONFINALμ >> NONFINALμμ >> NONFINALμμμ >> LICENSE-SEG

(27) LICENSE-SEG >> NONFINALμ >> NONFINALμμ >> NONFINALμμμ

In Latin (Streiade 1988a), Macedonian (Halle and Vergnaud 1987), and Warao (Osborn 1966), for example, the whole set of NONFINAL-σ outrank the whole set of LICENSE-SEG.[27] This is so because the last syllable, irrespective of its intrinsic prominence, always surfaces unstressed. Therefore, (RIfe)cit bests (*ri*fe)(CIT) in Latin, (vode)(NEča)rot bests (vode)(neča)(ROT) in Macedonian, and (yi*wa*)(raNA)e bests yi(waRA)(naE) in Warao. As the final syllable, irrespective of its intrinsic prominence, escapes footing, NONFINAL-σ then outranks LICENSE-SEG as in (28) below:

(28) Constraint ranking IVa NONFINAL-σ >> LICENSE-SEG
Basic Pattern IVa Latin, Macedonian, Warao, Polish, etc.

The mirror image of the constraint ranking in (20) above is attested in languages where the final syllable is always stressed (e.g. Tùrbatulabal, Weri, Winnebago, Ojibwa, etc.). Consider, For example, the following stress patterns:

(29) **Winnebago** (Hale and White Eagle 1980): Stress falls on every odd-

numbered syllable except for the first, and in case of disyllabic words, stress surfaces on the final syllable (e.g. wa**je**, hipi**rak**, hira**wa**haz**ra**, etc.)

Weri (Boxwell and Boxwell 1966 cited in Kenstowics 1994: 556): the final syllable is primarily stressed, and all preceding alternate syllables are secondarily stressed (e.g. *ku*li**pu**, ul*u***amit**)

Tùrbatulabal (Voegelin 1935 cited in Kenstowicz 1994: 562). Stress falls on every final syllable, all syllables containing long vowels and all preceding alternate syllables (e.g. ha**ni:la**, **yu:du:yu:dat**)

In all these stress patterns, the final syllable (irrespective of its quantity) never escapes footing, and so NONFINAL-σ has to be low-ranking. In Winnebago, for instance, a right-to-left parse results in binary right-headed feet. Therefore, (wa**je**) bests (**wa**)je, hi(pi**rak**) bests (hi**pi**)rak, and hi(ra**wa**)(haz**ra**) bests (hi**ra**)(wa**haz**)ra. And because the first syllable is prosodically inert (as it never carries stress), the optimal parses are wa(**je**), hi(pi**rak**) and hi(ra**wa**)(haz**ra**).[28] Accordingly, LICENSE-SEG outranks NONFINAL-σ.

(30)	Constraint ranking IVb	LICENSE-SEG >> NONFINAL-σ
	Basic Pattern IVb	Tùrbatulabal, Weri, Winnebago, Ojibwa, etc.

5. Conclusion

The proposal we advance here is that a final syllable is only stressed when it is the optimal parse derived by the interaction of all mora-sensitive parse and anti-parse constraints. The claim that there can ONLY be syllable extrametricality brings about a uniform analysis for conflicting views regarding final weight demotion effects (see McCarthy 1979a, Hayes 1981, 1982, Harris 1983, Al-Mozainy et al. 1985, Steriade 1988, Crowhurst 1996, Rosenthall & van der Hulst 1999, Abo-Abbas 2008). The novel insight is that parsing a syllable, irrespective of its position, is largely determined by its weight: the heavier the syllable is, the more likely it gets parsed. In more traditional terms, this basically means that the weight of the syllable is ONLY relevant at the foot formation level, but is totally irrelevant at the stress projection level. The rationale behind splitting NONFINAL and having it interact with LICENSE-σ is that we need to make sure that a final three-mora syllable ($\sigma_{\mu\mu\mu}$) gets footed in final position, and thus passes on to the next level (stress projection level); in the meantime, a light syllable (σ_{μ}) and/or a heavy syllable ($\sigma_{\mu\mu}$) escapes footing altogether (i.e. becomes prosodically inert), and is therefore filtered out prior to stress placement. One way to bring this about is to assume that NONFINAL applies distinctively to final syllables, resulting in three universally ranked constraints (NONFINAL-μ, NONFINAL-$\mu\mu$, NONFINAL-$\mu\mu\mu$). All in all, the presence (or lack thereof) of

stress on the final syllable is a function of the gross syllabification of the entire word, i.e. where exactly LICENSE-SEG (relative to parameterized NONFINAL-σ) is interleaved in the hierarchy. Given the suggestion that the multiple constraints of NONFINAL-σ are universally ranked relative to each other (NONFINALμ >> NONFINALμμ >> NONFINALμμμ), the relative rankings of LICENSE-SEG are four:

A. LICENSE-SEG dominates the whole set of NONFINAL-σ
   LICENSE-SEG>> NONFINALμ >> NONFINALμμ >> NONFINALμμμ
B. LICENSE-SEG is dominated by the whole set of NONFINAL- σ
   NONFINALμ >> NONFINALμμ >> NONFINALμμμ >> LICENSE-SEG
C. LICENSE-SEG is dominated by NONFINAL-μ, so that NONFINAL-μμ and NONFINAL-μμμ contrast with NONFINAL-μ
   NONFINALμ >> LICENSE-SEG >> (NONFINALμμ >> NONFINALμμμ)
   i.e. NF<μμ >> … >> NF≥μμ
D. LICENSE-SEG is dominated by NONFINAL-μμ, so that NONFINAL-μ and NONFINAL-μμ contrast with NONFINAL-μμμ
   (NONFINALμ >> NONFINALμμ) >> LICENSE-SEG >> NONFINALμμμ
   i.e. NF≤μμ >> … >> NF>μμ

An explicit prediction of the proposal is that mora extrametricality should not occur, i.e. no language should treat cvcc and cvv as heavy but treat cvc and cv as light. Another typological prediction is that unlike the varieties of Arabic under discussion which distinguish between two and greater than two moras, there are languages that make a distinction between one and greater than one mora. Finish and Estonian, for example, stress odd-numbered syllables but only final odd-numbered syllables that are heavy (for illuminating discussion see Hayes 1985, 1991 and Kager 1992).

The present study departs from previous research in at least three ways. First, NONFINAL is not 'a substantive stress-specific constraint'. *Therefore, NONFINALITY is interpreted as banning the parsing of final syllables into the foot structure of the word, rather than simply banning the assignment of stress to these syllables, as is usually the case in OT analyses of metrical systems* (See Prince and Smolensky 1993: 42, Crowhurst 1996: 415, Hyde 2003: 2). Second, by constraining the notion of extrametricality to only syllable extrametricality, we have challenged the bimoraic limit of syllables and feet advanced in almost all OT- and pre-OT-approaches to stress and the syllable in Arabic. Finally, the claim that parse and antiparse constraints are all mora-sensitive obviates the need for special constraints (cf. Prince and Smolensky's 1993 PK=PROM and WSP) that allude to the intrinsic prominence of the syllable. In conclusion, we believe that this proposed parse-based model proves to be superior to the more traditional approach that assumes final consonant extrametricality.

Notes

1. One contribution that we believe the present paper makes is that constraining extrametricality to syllable extrametricality involves trimoraicity- a claim that challenges the bimoraic limit of syllables and feet advanced in almost all OT- and pre-OT-approaches to stress and the syllable in Arabic (see discussion below).
2. The idea of NONFINALITY as a constraint on parsing is not new in OT, even if it remains nonstandard. Kager, (1999) presents an analysis of stress in Hixkaryana that involves essentially this interpretation of NONFINALITY. Kager notes the difference and suggests that the right interpretation of the constraint, or the possibility of multiple such constraints, remains an open question (for details see Kager 1999: 166). The proposal here is intended to question existing theories. To illustrate, an important contribution to metrical theory (Prince 1983, Halle & Vergnaud 1987, Kager 1989, Hayes 1995) is the insight that heavy syllables project stress because of their internal structure; and, therefore, there was always a need to have Smolensky's (1993) PK=PROM and WSP, the two constraints responsible for the intrinsic prominence of syllables, high ranking.
3. We will show, for example, how a final CVV (e.g. šaFUU) in Egyptian Arabic is stressed.
4. Accordingly, Hyde (2003: 2) reproduces foot, syllable and consonant extrametricality as follows:

a. ώNonFinal (F, ώ)
   No prosodic word-level gridmark occurs over the final foot of a prosodic word
b. FNonFinal (σ,ώ)
   No foot-level gridmark occurs over the final syllable of a prosodic word
c. μ NonFinal (C, ώ)
   No mora-level gridmark occurs over the final consonant of a prosodic word

5. We make a distinction between NONFINAL(μ) and NONFINAL-μ. Whereas the former applies to the last mora of the final syllable irrespective of its weight, the latter applies to syllables weighing just one mora.
6. Although this principle promotes a serial version of the theory, we do not intend to propose it as a constraint (not even a meta constraint), but as a universal requirement on presentation.
7. For all these languages, the final syllable is either invariably stressed or unstressed.
8. In pre-optimality literature, Selkirk 's (1981) Exhaustive Syllabification principle and Ito's (1986, 1989) Prosodic Licensing principle require the

association of every segment with a higher-level prosodic constituent.
9. Distinction is also drawn between LICENSE(μ) and LICENSE-μ: the former applies to the last mora of the syllable irrespective of its weight, but the latter applies only to syllables weighing just one mora. LICENSE(μ) is then an OT representation of Ito and Mester's (1992) 'Mora Confinement' which requires that every mora should only be associated with a syllable.
10. However, for some, final weight demotion is not an essential feature in their analyses.
11. Yip (2003) considers the possibility that the syllable, for example, is not a meaningful prosodic constituent.
12. One simple argument against the analysis which treats final Cs as degenerate feet is that it never solves the issue regarding which constituent is NONFINAL-is it the final mora or foot? Our analysis makes unequivocal that it is always the syllable irrespective of its quantity.
13. For final consonant extrametricality see Prince (1980) for Estonian; and for final syllable extrametricality see Hung (1994) for Aguaruna.
14. For a counter argument, see Halle and Vergnaud (1987: 18) and Everett (1996).
15. One piece of argument in favor of this claim is 'the rejection of stress by heavy antepenults' in many varieties of Arabic, including Classical and Modern Standard Arabic (e.g. mu.ʔal.**li**.ma)– a state of affairs which McCarthy (1979b: 446) considers ‘genuinely anomalous’ (For details see Al-Jarrah 2008a).
16. Given Arabic diglossia (Ferguson 1959), the High variety of Arabic (traditionally called Classical Arabic, and currently referred to as, and commonly confused with, Modern Standard Arabic) is produced by educated native speakers of Arabic in almost identical manner irrespective of the lower variety of Arabic they are native of. Qur'anic Arabic illustrates this point. Native speakers of Arabic, irrespective of their native dialect, recite the holy Qur'an in remarkably similar fashion. This does not mean that the stress patterns of the colloquial dialects never alter the Classical or the Standard patterns, but following McCarthy (1979b: 447) the accentuation of the local variety is 'another source of information' about the Higher variety stress rules. The High variety of Arabic or the so-called *ʔalfuşħa* is oftentimes contrasted with the regional dialects *ʔalɔammiya* (Ferguson 1959 (1972): 234). Numerous studies have noted that there are differences between the High variety of Arabic and the lower varieties as far as word stress placement is concerned. (Cf. Mitchell 1960, 1975, Langendoen 1968, Brame 1971, 1973, 1974; McCarthy 1979b, Welden 1980, Al-Ghazo 1984, Al-Mozainy et al. 1985, Al-Sughayer 1990, Broselow et al. 1995, Hung 1995, Broselow et al. 1997, Al-Jarrah 2002, Abu-Abbas 2003, Al-Mohanna 2005, Watson 2007, among others). Mitchell (1960 and 1975), for example,

asserts that Cairene is the lower variety of Arabic that has preserved many of the original stress patterns of Classical Arabic (for further details see McCarthy 1979b based on Mitchell 1975).

17.

Vernacular form	vs.	**Classical and Standard equivalent**
laab.siin 'wearing'		laa.bi.siin
xaalhum 'their uncle'		Xaa.lu.hum
saaf.ru		saa.fa.ru

18. Watson's syllabic typology is 'made principally on the position of the epenthetic vowel in phonologically and morpohologically derived CCC clusters' (for details, see Watson 2007: 340).

19. The orthography of Arabic makes this observation manifest:

daRAStu	درستُ	'I (SING) studied'
daRAStuu	درستوا	'You (PL) studied'
darasTUUH	درستوه	'You (PL) Studied it (MAS) '

20. As nonfinality constraints refer to surface forms, one way to assume that final dropped [h] is associated with a mora is to posit a high ranking faithfulness constraint such as MAX(Mora) that preserves its weight. In other words, we need to have correspondence constraints apply distinctively to segments and weight.

21. Another dialectal difference that falls outside the scope of this paper and requires further probing is that Classical Arabic allows 'longer strings of light syllables' (McCarthy 1979b: 447), and thus 'allows retraction of stress a potentially infinite distance from the right boundary, rather than the maximum of three syllables' (McCarthy 1979b: 461) as is in almost all the lower varieties of Arabic. In addition, some lower varieties of Arabic (e.g. Jordanian, Levantine, Iraqi, Saudi Arabic, etc.) have undergone more radical changes as far as word stress is concerned. For example, whereas a light penult is stressed in Classical Arabic even if preceded by a heavy penult (gaaTAla), stress in many lower varieties of Arabic shifts to the heavy antepenult (Cf. GAAtala).

22. /ʔ/ (Arabic ع) is the voiced pharyngeal guttural; /ʔ/ (Arabic ء) is the voiceless laryngeal guttural; /ħ/ (Arabic ح) is the voiceless pharyngeal guttural.

23. Monosyllabic words irrespective of their size show that LICENSE-PR (a lexical word must consist of a prosodic word) specifies a minimality requirement in that a lexical word must consist of a prosodic word, and so forces violation of NONFINAL-σ. Otherwise, the whole word would escape footing altogether.

24. We are aware that in some dialects (e.g. some Yemeni Arabic dialects) a nonfinal syllable ending in a long segment (long vowel or first leg of a geminate) can attract stress from final CVVC, but not from final CVCC (examples include SAAbuun 'soap'), emphasizing the argument that the

weight of the syllable is very much determined by its position.
25. As for non-head feet, Arabic is cited to disallow secondary stresses (see Mitchell 1960, Langendoen 1968, and McCarthy 1979a for Cairene Arabic; Brame 1973, and Kenstowicz & Abdul-Karim 1980 for Palestinian Arabic). In pre-optimality literature, Halle & Vergnaud (1987a) suggest 'conflation' as a repair mechanism that removes un-wanted secondary stresses. Crowhurst (1996) deals with conflation in Cairene Arabic in an optimality-theoretic fashion.
26. A crucial issue that stimulates further investigations and theory-building in this regard is how quantity figures in diverse stress systems. An important question a theory of extrametricality should answer is why heavy and light syllables behave in one group and superheavy syllables in another group. In many languages final heavy and light syllables cannot be stressed, whereas superheavy syllables can be stressed. In the standard account, a final mora is extrametrical in such languages. A final light syllable is degenerate and can therefore be prosodically inert, a final heavy syllable is prosodically light and can therefore not be the only member of a foot, but a final superheavy syllable is prosodically a heavy syllable, and can therefore be the only member of a foot. However, one serious problem of the standard account is that it does not explain why it is like this. The theory we are proposing here can account for this phenomenon quite straightforwardly. The thrust of the argument is like this: the grouping of heavy and light syllables is stipulated by the Strict Paring Principle, which says that in the ordered set (light, heavy, superheavy), grouping can only be made between adjacent members. However, it should be made clear that we are not proposing it as a constraint (nor a meta-constraint). And for it to be a universal requirement on representations, much work is still needed. We are aware that a decision such as this one could be underdetermined by the data. Therefore, we intend it to be no more than an exposition of the theory that could be subject to revision in light of new facts. However, to the best of our knowledge we have not as yet found counter evidence. Until then, we argue that the distinction is only between two universally ranked constraints, namely NONFINAL≤μμ, and NONFINAL>μμ.
27. The discussion here excludes Latin enclitics. For details, see (Steriade 1988a)
28. This is due to high ranking NONINITIAL-σ in Winnebago.

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Appendix: Interaction of NONFINAL-σ and LICENSE-SEG

Input: /baarid/ cold	NF$_{\leq\mu\mu}$	LICENSE-$_{\mu\mu}$	NF>$_{\mu\mu}$	FB-μ
a-☞ (BAA)rid		*		
b- (baa)(RID)	*!			

Table 14. Jordanian Arabic (unstressed final two-mora syllable)

Input: /badduuš / (want he not) he does not want	NF$_{\leq\mu\mu}$	LICENSE-$_{\mu\mu\mu}$	NF>$_{\mu\mu}$	FB-μ
a-☞ (bad)(DUUŠ)			*	*
b- (BAD)(duuš)		*!		*

Table 15. Jordanian Arabic (stressed final three-mora syllables)

Input: /ka.va.latt / 'cunning'	NF$_{\leq\mu\mu}$	LICE-μμμ	LICE(μ)	NF>μμ	FB-μ
a-☞ (KAva)(*laat*)				*	*
b- (KAva)latt		*!			

Table 16. Estonian (stressed final three-mora syllable)

Input: /pi.me.stav/ ‘blinding’	NF≤μμ	LICE-μμ	LICE(μ)	NF>μμ	FB-μ
a-☞ (PIme)stav		*	**		
b- (PIme)(*stav*)	*!				

Table 17. Estonian (unstressed final two-mora syllable)

Input: /re.te.li.le/ ‘ladder’	NF≤μμ	LICE-μ	LICE(μ)	NF>μμ	FB-μ
a-☞ (REte)(*li*)le		*	*		*
b- (REte)(*li*le)	*!				

Table 18. Estonian (unstressed final one-mora syllable)

Input: /refecit/	NFμ	NFμμ	NFμμμ	LICE-SEG
a-☞ (RIfe)cit				*
b- (*ri*fe)(CIT)		*!		

Table 19. Latin (unstressed final syllable)

Input: /vodeničarot/ ‘the miller’	NFμ	NFμμ	NFμμμ	LICE-SEG
a-☞ (vode)(neča)rot				*
b- (vode)(neča)(rot)		*!		

Table 20. Macedonian (unstressed final syllable)

Input: /waje/	LICE-SEG	NF-μ	NF-μμ	NF-μμμ
a-☞wa(JE)	*	*		
b- waje	**!			

Table 21. Winnebago (stressed final one-mora syllable)

Input: /hipirak/	LICE-SEG	NF-μ	NF-μμ	NF-μμμ
a-☞hi(piRAK)	*		*	
b- hi(PI)rak	**!			

Table 22. Winnebago (stressed final two-mora syllable)

Input: /hirawahazra/	LICE-SEG	NF-μ	NF-μμ	NF-μμμ
a-☞hi(raWA)(hazRA)	*	*		
b- hi(RA)(waHAZ)ra	**!			

Table 23. Winnebago (foot formantion)

Input: /kulipu/ ‘hair of arm’	Pσ	NFμ	NFμμ	NFμμμ
a-☞ (KUli)(PU)		*		
b- (*KU*Li)pu	*!			

Table 24. Weri (stressed final one-mora syllable)

Input: /uluamit/ Mist	Pσ	NFμ	NFμμ	NFμμμ
a-☞u(LUa)(MIT)	*		*	
b- u(lua)mit	**!			

Table 25. Weri (stressed final two-mora syllable)

Input: /hani:la/ The house	Pσ	NFμ	NFμμ	NFμμμ
a-☞ha(NI:)(LA)	*	*		
b- ha(NI:)la	**!			

Table 26. Tùrbatulabal (stressed final one-mora syllable)

Input: /yu:du:yu:dat/ ‘the fruit of mashing’	Pσ	NFμ	NFμμ	NFμμμ
a-☞ (YU:)(DU:)(YU:)(DAT)			*	
b- (YU:)(DU:)(YU:)dat	*!			

Table 27. Tùrbatulabal (stressed final two-mora syllable)