Syntax-prosody interface: Wh-movement in Jordanian Arabic and Egyptian Arabic*

Ayman Yasin
Purdue University
aymanolu@gmail.com

Richards (2006, 2010) suggests that wh-movement is prosodically driven. His analysis is based on the position of the Comp(lementizer) and the marking of prosodic XP edges: if Comp is on one side and the language marks the opposite side of the XP, then the wh-phrase does not move since Comp and the wh-phrase can create a prosodic wh-domain. However, if the language marks one side of the XP and Comp is also on the same side, a single wh-domain cannot be created and thus wh-phrase needs to move closer to Comp to have as few minor phrases as possible.

This paper addresses wh-movement in Jordanian Arabic (JA) and Egyptian Arabic (EA): the former moves the wh-phrase, whereas the latter mostly leaves it in situ. JA and EA would be a strong testing ground for Richards' theory since it is expected that they will behave alike given that both dialects, as well as other Arabic dialects, descended from Classical Arabic (CA) (Aoun et. al 2010) and that Comp is on the left periphery in both.

In this paper, I present phonological evidence for edge marking in each dialect. Specifically, I show how resyllabification and epenthesis blockage mark left edges of XPs in JA, whereas epenthesis and vowel reduction mark right edges of XPs in EA. The phonological evidence indicates that Richards' theory by and large works well for both dialects. However, as a follow up, an acoustic analysis for edge demarcation in both dialects revealed that the picture is not as neat as Richards wanted it to be.

1. Introduction

Richards (2006, 2010) claims that wh-movement does not take place unless the prosody requires it. His main proposal is that "the overt/covert distinction is indeed predictable from independently observable properties of language; in particular, we can predict what a language will do with its wh-phrases from the position of its complementizer, and the nature of its

* An earlier version of this paper was presented at ILLS 4 (2012), University of Illinois at Urbana Champaign. I am also deeply indebted to Ronnie Wilbur, Elaine Francis, David Snow, Elabbass Ben Mamoun, for their reviews and comments

Studies in the Linguistic Sciences: *Illinois Working Papers 2013*: 37-52

mapping of syntactic structure onto prosody" (2010:144). Richards, further, clarifies that all languages try to create a prosodic structure for wh-questions in which the wh-phrase and the corresponding Comp are separated by as few prosodic boundaries as possible (2010:199).

Richards puts forth two factors that allow or prevent the creation of the relevant prosodic domain: (1) whether the language-specific rules introduce a prosodic boundary to the left or to the right of the wh-phrase, and (2) the position of Comp (particularly, the Comp associated with wh-questions) at the left or right periphery. These factors interact as follows: if a language allows the creation of a prosodic domain that includes the wh-element at one edge and Comp at the other edge (as in Japanese and Chichewa), no overt movement takes place. These languages are capable of creating a 'wh-domain', which captures the wh-phrase and the associated Comp in a single domain, since the prosodic boundary is on the opposite side of Comp. By contrast, if a prosodic domain with the relevant characteristics cannot be created (as in Basque and Tagalog), the wh-element must move close to Comp in order to reduce its 'prosodic distance' from the interrogative Comp:

(Japanese)

(1) Naoya-ga **nani**-o nomiya-de nonda **no**?
Naoya-NOM what-ACC bar-LOC drank Q
'What did Naoya drink at the bar?'

(Tagalog)

(2) **Kailan** imuwi si Juan?
when NOM-went.home ANG Juan[1]
'When did Juan go home?'

The algorithm proposed by Richards for the creation of prosodic wh-domains is as follows:

(3) a. For one end of the larger Minor Phrase (MiP), use an MiP boundary which was introduced by a wh-phrase.

b. For the other end of the larger MiP, use any existing MiP boundary.

In Japanese, MiPs are established at left edges of syntactic XPs. Such left marking is determined by prosodic cues such as initial lowering (low tone

[1] ANG is a case particle in Tagalog for a nominal with which the verb agrees.

on the first mora of the phrase), lexical accent as well as some syntactic factors. The algorithm in (3) works as follows: in Japanese wh-questions, there is a prosodic domain that starts with a wh-phrase and ends with Comp. The wh-phrase has its pitch boosted (represented by bold type) and the material between the wh-phrase and Comp is characterized by pitch compression (represented by small type in (1)). Therefore, Japanese would be able to create a larger MiP containing the wh-phrase and Comp by keeping the MiP associated with the left edge of the wh-phrase and skipping the intermediate MiPs as in (4).

(4) a. [DP] [**whP**] [DP] V C
b. ( ) **(**)(**)**
c. ( ) **(** **)**

Like Japanese, Tagalog's MiP boundaries are established at the left edges of certain syntactic projections. Richards supports that with evidence from phrase breaks and final low tones that precede left edges of maximal projections. However, unlike Japanese, Comp in Tagalog is on the left. Therefore, the language cannot meet the conditions on wh-prosody by leaving the wh-phrase in situ. As a result, Tagalog must move the wh-phrase to the left periphery.

In sum, a prosodic domain that marks the wh-dependency can be created only if the prosodic boundary is located on the opposite side of Comp. If, however, the prosodic boundary and Comp are on the same side, this would prevent the wh-prosody from marking the wh-dependency, and forces the wh-phrase to move to [SPEC/CP] in order to reduce the 'prosodic distance' from the interrogative Comp.

2. Richards and Arabic

Although Richards mentioned languages in which both wh-in situ and wh-movement are allowable (e.g. French and EA), he did not provide details of how his claims would work in such languages. However, in discussing the languages that leave the wh-phrase in situ, Richards predicted that, if the words and phrases are the same, wh-movement ought to also be an option as long as the movement improves the prosodic structure of the question (2010: 155). He adds that this can be visible in complementizer-initial languages ,such as Tagalog and Chichewa, that leave the wh-element in-situ. Notably, he cites an example from Egyptian Arabic and another from French. Here I quote the example from EA (Richards 2010:156 example 19):

(5) a. qel Ali ʃtara eih? EA
Uncle Ali bought what
'What did Uncle Ali buy?'

b. eih ʃtara qel Ali?
What bought Uncle Ali

However, Richards did not provide any evidence that EA prosodically marks both edges of XPs in a way that would create wh-domains either when moving the wh-phrase or when leaving it in situ.

2.1 Prediction about Jordanian Arabic

Standard Arabic and Jordanian Arabic have Comp in the left periphery (Shlonsky 1997, Benmamoun 2000, Soltan 2007, 2010, Aoun 2010, Abedghani 2010). If it turns out that the prosodic boundary is on the same side, then it is predicted that no prosodic domain can be established and thus wh-phrase must move closer to Comp in order to reduce the prosodic distance from Comp. The following examples show how Richards' predictions may work for JA (predicted left boundaries of MiPs are indicated by ╠):

(6) a. C ╠ ʕomar ╠gaaʕed bi-txawwaθ
Ø Omar ASP-aux.PART IMPF.2S.M-joke
╠ ʕaʃaan l-banaat
because the-girls
'Omar is joking because there are girls around'

b. ╠ leiʃ$_{I}$ C ╠ ʕomar ╠ gaaʕed b-yi-txawwaθ ?
why Ø Omar ASP-aux.PART IMPF.2S.M-joke
'Why is Omar joking?'

c. *C ╠ ʕomar ╠ gaaʕed b-yi-txawwaθ ╠ leiʃ$_{i}$?

Richards' theory predicts that in (6), Comp and the two MiP boundaries, the subject NP *ʕomar* 'Omar' and the VP *gaaʕed b-yi-txawwath* 'be joking' must precede wh-phrase or the phrase that it stands for, *ʕaʃaan l-banaat* 'because of the girls'. Thus, JA will not be able to create wh-domains, because the procedure for creating wh-domains starts by keeping the MiP boundary projected by the wh-phrase, and the boundary projected by Comp. However, there are two MiP boundaries between the wh-phrase and Comp. Consequently, creating a larger MiP boundary will not

improve the prosodic structure since the number of the MiPs remains the same (2 in this case). In other words, a larger MiP that includes the in-situ wh-phrase and Comp could not be created because we cannot reduce the number of the intermediate phrases as seen in (6c). Therefore, the wh-phrase needs to move closer to Comp as shown in (6b) where the number of the intervening boundaries between them has been reduced to 0.

2.2 Prediction about Egyptian Arabic

In addition to JA, Egyptian Arabic (EA) is also a Comp initial dialect (Soltan 2007, Hellmuth 2006, Aoun , Choueiri & Benmamoun 2010). At the same time, EA, unlike the majority of other Arabic dialects, strictly prohibits fronting of wh-arguments (Soltan 2010:1). However, wh-adjuncts, Soltan adds, occur in-situ by default, but they may also appear fronted in the clause without clefting.[2] Generally speaking, since the wh-phrase often remains in situ, Comp and MiP boundaries are predicted, from Richards' perspective, to be on opposite sides. Thus, EA is able to leave wh in-situ, by creating a larger MiP containing both the wh-phrase and its associated Comp; in this case, the larger MiP will begin with Comp and end with the wh-phrase as shown in (7). Examples (8-9), by contrast, show that there are still some restrictions on the optionality of movement.

(7) a. C [DP] [whP]
b. **(**) (**)**
c. **(** **)**

(8) a. bi-ti-ttarjaʔ **leih**?
ASP -IMPF:2S.M-mock why?
'Why are you mocking?'

b. **Leih$_i$** bi-ti-tarjaʔ t_i ?
why ASP -IMPF.2S.M-mock ?
'Why are you mocking?'

(9) a. bi-kaffar Omar ʔinni Muna katabi-t **eih**?
IMPF.3S.M-think Omar that Muna write.PRF-3S.F what
'What did Omar think that Muna wrote?

[2] It is important to mention that the in-situ wh-phrase even in embedded clauses can take scope over the matrix or the embedded CP, depending on the selectional restrictions of the matrix predicate.

b. ***eih**$_i$ bikaffar Omar ʔinni Muna
what IMPF.3S.M-think Omar that Muna
katabi-t t_i ?
write.PRF-3S.F
'What did Omar think that Muna wrote?'

According to Richards, wh-questions are constrained by a requirement that the wh-phrase be separated from Comp where it takes scope by as few MiP boundaries as possible, for some level of Minor Phrasing. A procedure for the creation of new MiPs allows some languages to satisfy this condition without movement because Comp and the wh-phrase are on opposite sides of the larger MiP (Richards 2006, 2010). However, since EA also allows wh-movement as in (8b), this suggests that Comp and the phonological phrase boundary are on the same side in that case. Therefore EA must resort to moving the wh-phrase as close to Comp as possible in order to improve the prosodic structure. Accordingly, the fact that EA, as is the case for some other languages such as French, accepts wh-in-situ as well as wh-movement points to demarcating both edges of phonological phrases.

Since the demarcation of the phonological phrases is pivotal here, it is crucial to present some phonological evidence for edge-marking in both dialects, and find out how syntactic constituents are mapped onto the phonological phrases.

3. Edge Marking

In addition to testing Richards' theory, this study aims at finding which boundaries of XPs are being marked in JA and EA.

3.1 Edge Marking in JA

Here I present two phonological pieces of evidence for left edge marking in JA: Resyllabification and Epenthesis Blockage.

3.1.1 Resyllabification

Resyllabification usually applies across word boundaries within a Phonological Phrase (p-phrase) since a word-final consonant is restructured as the onset of the following syllable (Nespor & Vogel 2007).

As a consequence, resyllabification constitutes a problem for the Strict Layer Hypothesis[3] (Selkirk 1980, 1984, Nespor & Vogel 2007) since the edges of syllables (10a) are not aligned with the edges of PWds (10b), and thus this will result in a mismatch in edge-marking at the next higher level (10a represents *syllable level* and 10b *PWd level*)

(10)	madrasa-t	ʔal-Furqaan	ʔal-θaanawijja-h
	school-F	the-Furqaan	the-secondary-F
a.	mad.ra.sa.	**t**il.fur.qaa	**n**iθ.θaa.na.wij.ja
b.	(madrasat)ω	(lfurqaan)ω	(θθaanawijja-h)ω

'The-Furqaan high school'

Watson (2007:61) suggested that the domain of syllabification in SA and most Arabic dialects is the Phonological Phrase, with the result that syllables frequently cross word boundaries. Abdelghani (2010:103) states that "resyllabification which is a post-lexical prosodic restructuring results in the formation of post-lexical prosodic words, which differ from the lexically built prosodic words from which they are derived".

Resyllabification is an active prosodic process in Arabic. Specifically, it is very active in dialects that allow consonant clusters such as JA. What is more important for our study here is that resyllabification can be taken as evidence for left edge marking in JA which allows a two-consonant cluster to appear in the onset. A rule of resyllabification applies to onset cluster in JA under certain syntactic conditions. It applies to words that are not XP-initial, that is, heads that are preceded by other material in their syntactic projection:

(11) [**mH**ammad **Gd**eisaat]$_{NP}$ [**ʃt**araa.l-u **gl**aam]$_{VP}$
(mHam.ma.de**G.d**eisaat) (**ʃt**araa.lu**g.l**aam)
[wa-ʕTaa **kt**aab]$_{VP}$
(waʕ.Taa**k.t**aab)
'Mohammed Gdeisaat bought him some pens and gave him a book'

The *gd* cluster in *gdeisaat* has been resyllabified due to the introduction of another word '*mHammad'* before it in the same syntactic projection.

[3] Strict Layer Hypothesis states that "a category of level *i* in the hierarchy immediately dominates a category at level *i*-1" (Selkirk 1984:26). SLH requires prosodic constituents to be properly nested within the constituents that dominate them. Syllabification, therefore, should not cross prosodic word boundaries. However, many languages allow phrasal re-syllabification across prosodic words which, in turn, violates SLH.

However, the *mH* cluster of the introduced NP *mHammed* has not been resyllabified because it is in an XP-initial position. Resyllabification also applies to *glaam* 'pens' and *ktaab* 'a book' in non-initial position but not to ***ʃt****araa.l-u* 'bought for him' in a VP initial position.

If we accept the alignment constraints proposed by Selkirk (1995), then the left edge of XPs and left edges of p-phrases coincide by ALIGN XP, L, and an XP-initial position will become a p-phrase initial position. Resyllafication, then, can be formulated as in (12).

(12) RESYLLABIFICATION: An onset consonant cluster resyllabifies except in the prosodic word immediately following the left edge of a p-phrase.

Resyllabification, therefore, applies to ***gd****eisaat,* ***gl****aam,* ***kt****aab* in non-initial position of a p-phrase in (11). However, the fact that resyllabification does not apply to the N ***mH****ammed* and the V ***ʃt****araalu* 'bought to him' is evidence of the sensitivity of left edge boundaries for the application of the rule.

3.1.2 Epenthesis Blockage

All the words that end with a consonant cluster in SA keep this cluster in EA, but most of them lose it in JA when they occur in a final position:[4]

(13)	a.	qa**br**	ʔa**kl**	ma**zH**	SA
	b.	ʔa**br**	ʔa**kl**	ma**zH**	EA
	c.	ga**bir**	ʔa**kil**	ma**ziH**	JA
		'tomb'	'food'	'kidding, joking'	

However, the vowel insertion is optionally blocked when introducing a ω to the p-phrase after the ω that contains the consonant cluster:

(14) ʕomar [$_{VP}$ zaar [$_{NP}$ ga**br** ʕamm-uh]]
Omar visit:PRF:3SM tomb uncle-his
'Omar visited his uncle's tomb'

[4] There are some words that keep the consonant cluster in JA such as *ʔarD* 'earth', and *Sinf* 'type, class' although one can sometimes hear Jordanians say *ʔareD* and *Sinif*. I leave the phonological environment for all contexts of epenthesis for further research.

This process is syntactically governed since the word under question must be followed by a word/phrase within the same XP. The rule of vowel epenthesis can then be formulated as the following:

(15) a. Ø→[ɪ] / [[C-----C#]ω #]$_{XP}$ *vowel epenthesis*
b. Ø→ Ø / [[C-----C#]ω [ω]]$_{XP}$ *epenthesis blockage*

The rule in (15a) indicates that a vowel [ɪ] is inserted between two consonants in the coda of a prosodic word ω if that word is in a final position of an XP. However, the rule does not apply when that word is followed by another ω in the same XP as shown in (15b). To decide whether this process marks either edge, consider the following examples which contain more than one ω that ends in a consonant cluster at the edges of XPs or within the same XP:

(16) a. [$_{TP}$ ʔana ʃuft-uh [$_{AdvP}$ ga**bil** #]]$_{IP}$
I saw-him before
[$_{TP}$ʔimbaareH kaan fi-l-dʒaamʕa] $_{IP}$
yesterday was in-the-university.
'I saw him before, yesterday he was at the university'

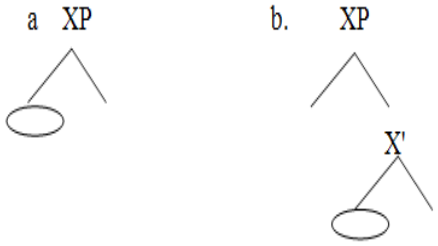
b. [$_{TP}$ʔana ʃuft-uh [$_{PP}$ ga**bl** ʔimbaareH]$_{IP}$
I saw-him before yesterday
[$_{TP}$ kaan fi-l-dʒaamʕa] $_{IP}$
was in-the-university.
'I saw him before yesterday, he was at the university'

c. [$_{TP}$ʔana ʃuft-uh [$_{PP}$ ga**bil** ʕa**Sr** ʔimbaareH]$_{IP}$
I saw-him before afternoon yesterday
[$_{TP}$ kaan fi-l-dʒaamʕa] $_{IP}$
was in-the-university
'I saw him before yesterday afternoon, he was at the university'

In (16a), epenthesis takes place since the consonant cluster in *gabl* 'before' is not followed by any other p-phrase within the same XP, which aligns with an *IP*. However, in (16b), epenthesis does not take place due to the presence of another prosodic word after *gabl* in the same XP. By contrast, there are two words that end with a consonant cluster *gabl* 'before' and *ʕaSr* 'afternoon' before the last prosodic word in (16c). In this case, epenthesis is blocked only in one word *ʕaSr*. The lack of epenthesis only on the penultimate word in the XP *gabil ʕasr imbaareH* suggests that there is a left edge boundary immediately before the last branching XP which is in this case the NP *ʕasr imbaareH* of the PP *gabil*

ʕasr imbaareH. Stated differently, epenthesis applies except in the ω immediately following the left edge of the last branching XP or X' (as indicated by ◯ in 17).

(17)



3.2 Edge Marking in EA

Here, I present two phonological processes that are sensitive to edge marking in EA: Epenthesis and vowel reduction.

3.2.1 Epenthesis

Epenthesis in EA is a very productive process that takes place between words in the same p-phrase. Watson (2007:64) points out that "epenthesis applies systematically in EA, and robustly across speakers, to break up sequences of three consecutive consonants, reportedly across word boundaries". Hellmuth (2006) also presented empirical evidence that supports this conclusion.

Notably, epenthesis applies across word boundaries within a domain larger than a phonological phrase (MaP) (Watson 2007). However, we need first to find out whether epenthesis occurs within XPs or across them. To test that, consider the following example:

(18) a. [$_{TP}$[$_{VP}$ ʃu**ft**]]? [$_{TP}$ [$_{NP}$ **l**-musalsal da]
see(you)? the-series this
[$_{PRED}$ Hi**lw** ɪ **ʔ**awi]]
nice much
'Did you see? This series is very nice'

b. [$_{TP}$[$_{VP}$ ʃu**ft** ɪ **l**-musalsal da]] ? [$_{TP}$ [$_{PRED}$ Hi**lw** ɪ**ʔ**awai]
See(you) the-series this nice much
'Did you see this series? It is very nice'

Example (18a) has two three-consonant clusters. The first one occurs between two words that belong to two different XPs: *shuft* is dominated by the VP of the first TP, and *l-musalsal* is dominated by the subject NP of the second TP. Since the two ω's do not form a syntactic constituent that can be aligned with a p-phrase (McCarthy & Prince 1993, Selkirk 1995), no epenthesis takes place. In (18b), on the other hand, the same cluster occurs within one XP, hence one MaP, and epenthesis holds. In the second consonant cluster *lw ʔ*, by contrast, epenthesis takes place between *Hi**lw*** and ***ʔ**awi* since both words belong to one XP(PredP) that constitutes a MiP in both (18a-b).

Note, further, that epenthesis can take place whenever a new word that has a consonant cluster in the coda is introduced in the same XP:

(19) [$_{TP}$[$_{VP}$ ʃu**ft** $_{I}$ **[** **ʔ**a**bl** $_{I}$ **[** **f**a**gr** $_{I}$ **[** **s**-sa**bt**]$_{IP}$
Saw(I) before dawn Saturday
[$_{NP}$ musalsal **[**Hi**lw**] $_{IP}$
series nice
'I saw a nice series before Saturday's dawn'

The [ɪ] surfaces after the coda consonants of the ω when followed by another ω within the same XP. Therefore, it obligatorily applies in the first three potential positions for epenthesis of the VP *shu**ft** ga**bl** fa**gr** s-sabt* but not in the last one because *s-sabt* and *l-musalsal* belong to two different *IP's*. It does not apply to *Hilw*, the last ω in the sentence, because it is not followed by any material. But what if we have an XP and a YP in the same *IP*? Does epenthesis apply? To answer this question, consider the following example:

(20) [$_{NP}$ ʕa**mr**] [$_{VP}$ ʃi**rb** $_{I}$ l-xa**mr**]
(ʕa**mr** ʃi**rb** $_{I}$ l-xa**mr**)$_{IP}$
amr drank-EPN the-wine
'Amr drank wine

The example in (20) has three potential positions for epenthesis: the first between the subject NP and the VP where epenthesis does not apply, the second between the V and the internal NP where epenthesis applies, and the third at the end of the phrase where it does not apply because it is in final position. This nonapplication of the rule between the subject NP and the VP suggests that epenthesis does not apply across XPs even if they are in the same *IP*. By contrast, the application of the rule between the V and

the internal NP indicates an absence of a right edge boundary just after the head verb. Thus, the epenthesis rule in EA can be formulated as in (21).

(21) $\emptyset \rightarrow [I]/\left[[CC\#]\omega \cdots\cdots [\omega]\right]_{XP}$

A vowel [ɪ] is inserted between two ω's in the same XP when the first word ends with a consonant cluster.[5] The formula suggests that epenthesis applies in the absence of a right boundary after the first word. Put differently, it occurs in a non-final position of an XP. This is supported by the fact that the rule did not apply in (20) between NP and VP because they belong to different XPs. In sum, a vowel [ɪ] is inserted, except in the ω immediately preceding the right edge of an XP.

Adopting Selkirk's (2001) alignment constraint: ALIGN R, XP, MaP "For each XP there is a MaP such that the right edge of XP coincides with the right edge of MaP", the fact that epenthesis does not apply across XPs indicate that a right edge boundary is at play for the application or nonapplication of the rule.

3.2.2 Vowel Reduction

The second argument for edge marking in EA deals with optional vowel reduction. Vowel length is phonemic in Arabic and the difference in vowel length results in a difference in meaning:

(22)	a.	S**a**H	'right'	S**aa**H	'(he) cried'
	b.	z**i**r	'button'	z**ii**r	'a big old jar '
	c.	f**u**l	'a kind of flower'	f**uu**l	'a kind of beans'

The Arabic writing system is called an *abjad* since only consonants and long vowels are written and the reader must determine which short vowel occurs in the word, based on knowledge of the syntax and morphology (Abdelghani 2010:86). Short vowels, if needed, are marked by diacritics. The three words on the left in (22a-c) are, therefore, written as two (consonant) letters each, and readers have to fill in the vowels as they read.

Al-Ani (1978) reports that the relative duration of the Arabic short vowels in medial and final position is (100-150) ms, while for long vowels it is

[5] Arabic does not allow any word to start with a vowel. Therefore, in the rule above it is redundant to identify the nature of the first segment in the second word.

(225-350) ms. Such a difference makes it easy for hearers to distinguish between a short or long vowel regardless of their position.

However, in some cases long vowels get shortened/'reduced' in EA. In the literature, this phenomenon is usually caused by stress clash which could be resolved by stress shift as in English, or is counteracted by removing the stress altogether as in Italian (Nespor & Vogel 2007).

Here, I show that EA uses the Italian strategy: one of the stresses is deleted by vowel reduction.[6] The examples in (23-24) give an indication about the application of vowel reduction.

(23) a. [$_{TP}$ ma ʔul-t-iʃ kida] [$_{TP}$ huwwa lli **ʔaal**].
NEG said-I-NEG like this he that said
'I did not say that. It is him who said (that).'

b. *[$_{TP}$ ma ʔul-t-iʃ kida] [$_{TP}$ huwwa lli **ʔal**]]
NEG said-I-NEG like this he that said
'I did not say that. It is him who said (that)'

(24) a. [$_{TP}$[$_{NP}$ huwwa [$_{VP}$ **ʔal** [$_{NP}$ eih]] [$_{PP}$ fi-l-ʔigtimaaʕ]] ?
He said what in-the-meeting
'What did he say in the meeting?'

b. [$_{TP}$ [$_{NP}$ ʕomar [$_{VP}$ ***ʔal / ʔaal** [$_{PP}$ fi-l-ʔigtimaaʕ]]
Omar said in-the-meeting
[$_{NP}$ k**alam** ga**meel**]]
talk nice
'Omar gave a nice talk at the meeting'

First, it is evident from (23b), that vowel reduction cannot take place if the word that contains the superheavy syllable is in a phrase final position. Second, non-finality, per se, is not enough for the application or non-application of vowel reduction since it applies to the non-final verb *ʔal* in (24a) but is blocked for the same word in the same non-final position in (24b). A closer look reveals that the difference between the pairs of examples in (24) is governed by the syntactic and prosodic parsing of the phrase as well as the size of the complement.

From a syntactic standpoint, the XP which contains the word that has the superheavy syllable must be branching, i.e. it needs to have some

[6] Vowel reduction in EA is subject to regional variation. However, the discussion here will concentrate on the environment where such a rule can apply.

complement or adjectival modification. Thus, (23b) is excluded since the verb is not followed by any complements or adjuncts. However, this does not indicate that just any material after the word under investigation meets our criterion since branchingness entails that the two words belong to the same syntactic unit (same XP). On this basis, unlike (25a), *kalaam* 'talk, speech' in (25b) is not branching since *gameel* 'a proper name' is dominated by the subject NP of the second clause.

(25) a. [$_{NP}$ ka**lam** gameel]
talk nice
'A nice talk'

b. [$_{TP}$ simiʕ-t minnu-h [$_{NP}$ ka**laam /*** ka**lam**]]
heard-I from-him talk
[$_{TP}$[$_{NP}$ gameel] ma- Habbu-h-uush]]
Jameel NEG-like-it-NEG
'I heard a talk from him, Jameel did not like it'

The nonapplication of VR in (25b) gives evidence for the presence of a right boundary between the two TPs, hence blocking the VR rule.

In addition to the syntactic condition mentioned above, there is a size constraint: the phrase that contains the superheavy syllable must consist of two prosodic words. In (24a) above this constraint is achieved by adding the prosodic word *eih* into the VP . By contrast, *fi-l-ʔigtimaaʕ* 'in the meeting' in (24b) is a MiP, or a clitic group in Nespor and Vogel's terms.

Vowel reduction in EA, then, takes place only in phrases that consist of two and only two prosodic words in the same XP. This is best captured by the term MiP, a phrase that is generally composed of two prosodic words, which was proposed for Japanese (Poser 1984, Kubozono 1993), Korean (Jun 1998), and later adopted for other languages including Egyptian Arabic (Hellmuth 2006)[7].

Still, there are more prosodic and phonological constraints that restrict the application of VR: first, if the superheavy syllable is subject to resyllabification, then vowel reduction is blocked. Compare (26 to 27a-b).

(26) ka**lam** faareʁ [ka.**lam** faa.regh]
Speech empty
' nonsense'

[7] However Hellmuth suggests that the constraint on the size of the MiP may be looser in Semitic languages.

(27) a. kalaam l-Hub [Ka.laa.**mel**.Hub]
Speech the-love
'talk of lovers'

b. *ka**lam** l-Hub

Second, the second word must have a long vowel that attracts phrase stress as seen in the long vowel /aa/ in ***faa**regh* in (26) above. This suggests that EA deaccents, or reduces, the vowel of the first stressed syllable in a p-phrase as an avoidance strategy of stress clash.

Finally, and most importantly, VR does not apply when the two prosodic words belong to two different XPs as we have seen in (25a-b) above.

VR applies in (25a) because *kalam* is in a non-final position of a MiP. The nonapplication of VR in (25b) above is accounted for by the presence of a right edge after *kalaam* that blocks it from forming a MiP with the next word *gameel*. Thus, the VR rule is sensitive to the presence of right boundaries.

3.4 Summary

This paper attempted to find out if wh-movement in JA and EA is prosodically driven as claimed by Richards (2006, 2010). The paper presented phonological evidence for edge marking in both dialects**.** The findings strongly support Richards' predictions: because wh-phrases move to [SPEC CP], JA is expected to mark left edges of XPs. By the same token, since wh-phrases often remain in situ, EA is expected to mark right edges of XPs. As mentioned before, EA accepts wh-movement under certain conditions with a lesser degree. However, the data investigated in this paper involve only wh-in-situ; hence the prediction of right edge marking.

As a follow up, a *Praat* acoustic analysis was performed to examine Richards' claims in light of the data from JA and EA. The analysis also aimed at finding out some acoustic cues that take place at the edges of syntactic XPs in Arabic. The analysis, in fact, confirms Richards prediction about marking both edges in EA. However, JA was also found to have marked both edges with variant degrees of strength.

If Richards' theory is to be maintained, then marking the edges of the prosodic phrases is a matter of a continuum: all languages mark both edges with different degrees. Accordingly, and taking Richards' analysis

into account, wh-movement is driven by how strong these marking features are on one side or the other of the prosodic phrase. Thus, since JA tends to move the wh-phrase in most cases, and EA moves it optionally, a good question to ask is whether such non-obligatory operations can be accounted for in terms of the strength of edge-marking.

REFERENCES

Abdelghani, Hala. 2010. Prosodic phrasing and modifier attachment in Standard Arabic sentence processing. New York: The City University of New York.

Al-Ani, Saleh, H. 1978. An acoustical and physiological investigation of the Arabic/E/, in Saleh Al-Ani (ed.) Reading in Arabic linguistics. Bloomington: Indiana University Linguistics Club 89-101.

Aoun, Joseph, Choueiri, Lina & Benmamoun, Elabbas. (2010). The syntax of Arabic. Cambridge University Press. New York.

Benmamoun, Elabbas. 2000. The feature structure of functional categories: A comparative study of Arabic dialects. USA: Oxford University Press.

Boersma, Paul. & Weenink, David. 2006. http://www.fon.hum.uva.nl/praat/download_win.html. Version 5.3.0. Last Accessed On Dec 28, 2011.

Hellmuth, Samantha. 2006. Intonational pitch accent distribution in Egyptian Arabic. London: University of London.

Jun, Sun-Ah. 1998. The accentual phrase in the Korean prosodic hierarchy. Phonology 15, 189-226.

Kubozono, Haruo. 1993. The organization of Japanese prosody. Tokyo: Kurosio.

McCarthy, John & Prince, Alan. 1993. Generalized alignment. Yearbook of Morphology 79-153.

Nespor, Marina & Vogel, Irene. 2007. Prosodic phonology. Berlin: Mouton De Gruyter.

Poser, W.J. 1984. The phonetics and phonology of tone and intonation in Japanese. PhD dissertation. MA: MIT.

Richards, Norvin. 2006. Beyond strength and weakness. MA: MIT.

Richards, Norvin. 2010. Uttering trees. MA: The MIT Press.

Selkirk, Elizabeth. 1986. On derived domains in sentence phonology. Phonology Yearbook 3, 371-405.

Selkirk, Elizabeth. 1995a. Sentence prosody: Intonation, stress, and phrasing, in John Goldsmith (ed.) Handbook of Phonological Theory.

Selkirk, Elizabeth 2001. The Syntax-phonology interface. International Encyclopedia of the Social and Behavioral Sciences 15407-15412.

Selkirk, Elizabeth O. 1980. The Role of prosodic categories in English word stress. Linguistic Inquiry 11, 563-605.

Shlonsky, Ur. 1997. Clause structure and word order in Hebrew and Arabic: An essay in comparative Semitic syntax. USA: Oxford University Press

Soltan, Usama. 2007. On formal feature licensing in minimalism: Aspects of Standard Arabic morphosyntax. Doctoral dissertation. Maryland: University Of Maryland.

Soltan, Usama. 2010. On licensing wh-scope: Wh-questions in Egyptian Arabic revisited. Proceedings of the 2010 Georgetown University Round Table on Arabic Language and Linguistics.

Watson, Janet.C.E. 2007. The phonology and morphology of Arabic. USA: Oxford University Press.