A Preliminary Analysis of the Intonation of Riyadh Saudi Arabic*

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1. Introduction

The aim of this paper is to present a phonetic and phonological analysis of the intonation of Riyadh Saudi Arabic (RSA). This paper focuses on the basic intonation patterns in sentences and questions.

Section 2 of this paper gives a description of the methodology used in determining the intonation patterns. I also describe intonation and stress in declarative, imperative, and interrogative sentences. Section 3 presents a phonological analysis of RSA intonation. It also accounts for the question morpheme and the prosodic structure of phrases. Section 4 presents the conclusions along with proposals about future research.

1.1 Results

Declarative sentences in RSA (Riyadh Saudi Arabic) have an intonation structure of H%...**H*L**-… L%. Prosodic phrases essentially coincide with every lexical word. There is a H% boundary tone at the left edge of every sentence, a H* pitch accent on every phrase-stressed syllable, and a phrase accent L- tone at the right edge of every phrase.

Imperatives have a general intonation structure of H%...H*L%. Both declaratives and imperatives have a H% at the left intonational phrase (IP) boundary, the pitch accent is H*, and the right boundary tone is L%. The difference between the imperative and declarative is in the number of PPhs in an IP. The phonological motivation for imperatives to having one PPh derives from the imperative morpheme, which is an H* that requires that it both be right-aligned, and attach to the head of an intonational phrase.

Questions *add* a H* tone at the right edge of the last word just before the low tone. Consequently, the final word in a question has the tone structure H*H-L%. The evidence for this structure is that the second H is so much higher than all the other Hs, indicating that there is an H before it. There is also late realization in both questions and sentences.

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2. Description

2.1 Methodology

I provided the data for this study. I am a native speaker of the Riyadh Saudi Arabic dialect. I am a 21-year-old male speaker of what is often described a 'standard' Riyadh dialect. I have no speech defects.

The recordings were made in a quiet environment with very little to no outside sound interference. I used a Logitech USB Desktop Microphone connected to a PowerBook G4 Apple laptop operating on a Mac O SX system. The software used is *Praat* (version 4.3.2.1).

The data consist of sixty recordings of sentences read at my average speed. The sentences were designed to vary in length and phrase stress. The pitch tracks were segmented, word-stress was marked, and points of relatively high (H) and relatively low (L) F_0 were identified. Incidental perturbations on the pitch tracks were ignored as they could be ascribed to physical factors of implementation. Basic figures were made to illustrate the fundamental form of intonation in the examples. A number of representative sentences are given below in declarative and interrogative forms to show the basic structure of intonation in various environments.

2.2 Declaratives

Word stress is assigned to the rightmost heavy syllable, otherwise the initial syllable – it is a quantity-sensitive default-to-opposite system (Kager 2006). Figure (1) schematically illustrates the basic structure of intonation in a short declarative sentence, i.e. the rising and falling of the tone and frequency of the pitch in a short utterance.

(1) {[ʕá] [li]} {[ʒá] [ra]}

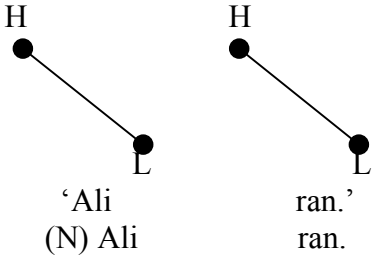
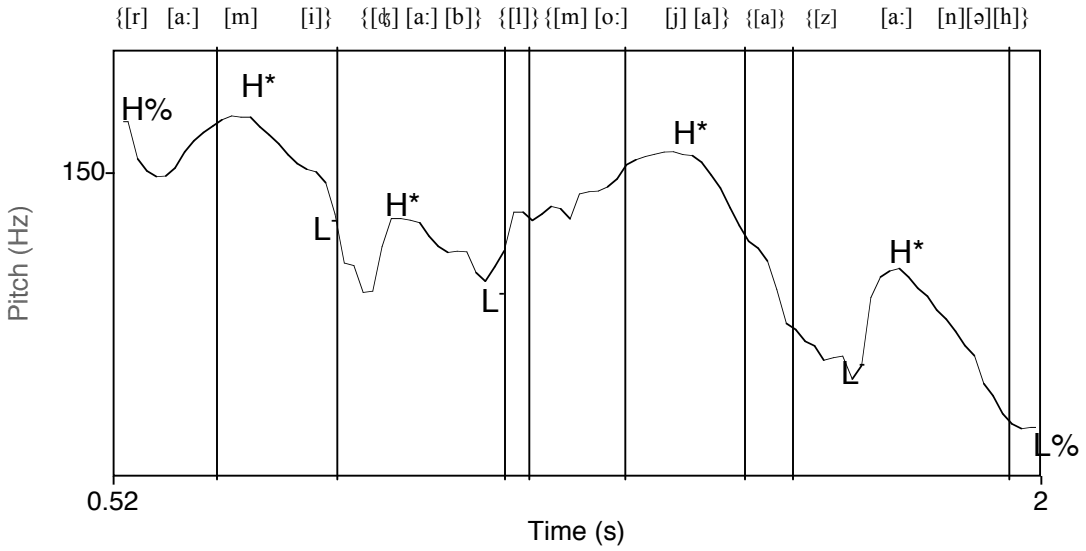


Figure (1) shows words with a CV.CV structure. Since there are no heavy syllables in either words, primary stress falls the on the initial syllable. The same stress pattern applies to the second word: primary stress falls the on first stressed syllable [ʒá], and no stress on [ra]. The H*L⁻ tune appears on every word, indicating that Prosodic Phrases coincide with Prosodic Words.

Another example of a longer sentence is given below to show how word stress is assigned to the rightmost heavy syllable, otherwise the initial syllable. Stress influences the intonation pattern, as shown in pitch track (2), which illustrates the basic structure of

intonation in a declarative sentence, i.e. the rising and falling of the pitch. I must note that while Classical Arabic is a 'Verb Subject Object' language, in Riyadh Arabic SVO order is more common.



(2). {[rá:.mi]} {[ʤá:b]} {[l mo:.jah]} {[a za:.nah]}
(N) Rami brought the water the good
'Rami brought the good water.'

Pitch track (2) illustrates the intonation of the sentence and shows the stress in declaratives. There is significant late realization throughout – notice the position of the H* pitch accents relative to the stressed syllables.

At the beginning of the sentence there is a H% boundary tone on the first phone [r]. As noted above, all utterances in RSA begin with a H% tone on the left edge boundary. If there was no left-edge H%, the pitch would begin lower – at 'rest' position. I consider the 'dip' in tone between the H% and H* as due to interpolation – it is a typical 'sagging contour', perhaps slightly lowered due to the inherent lower pitch of the low vowel [a:].

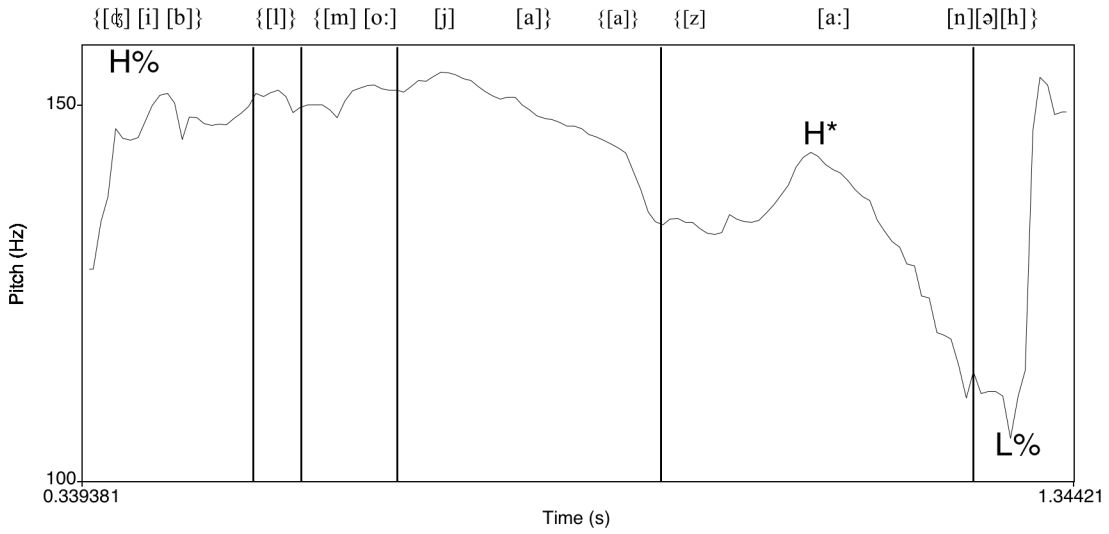
All stressed syllables have a pitch accent H* tone. In the first word [ra:.mi], the first syllable is stressed. The same stress pattern applies to all the stressed syllables in the sentence, such as [ʤa:b], [mo:] in [mo:.jah], and [za:] in [za:.nah]. The phrase accents L- occur at the right boundary of each word. As could be seen, there is a L- tone at the right edge of each of the words in the above sentence.

There are several phonological processes that alter the segments. Unstressed vowels are reduced as in /za:nah/ → [za:.nəh]. In RSA, the vowel [a] is deleted in [ʔal] 'the' if followed by a stop as shown above [ʔal mo:ja] → [l mo:ja]. In the cases where there is a fricative following [ʔal], the [l] is deleted (/ʔal za:neh/→[aza:neh]).

The above declarative sentence has the following intonation structure: H%H*L- H*L- H*L- H*L%.

2.3 Imperatives

To make a clear generalization about the intonation structure in RSA, I analyzed imperatives of different lengths and structures. A representative pitch track (4) is shown below to illustrate the intonation pattern of an imperative sentence.



(4). {[ʤib] [l mo:.jah] [a za:.nah]}
bring the water the good (imperative)
'Bring the good water!'

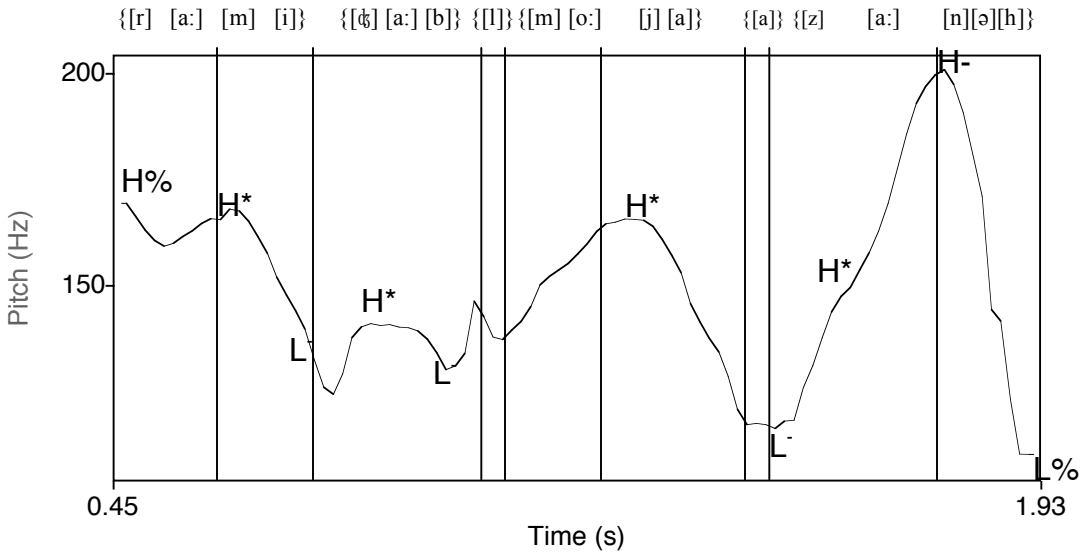
Imperatives have a general intonation structure of H%...H*L%. The imperative and declarative tunes are remarkably similar. Both have a H% at the left intonational phrase (IP) boundary, the pitch accent is H*, and the right boundary tone is L%. The difference is that the many tones are eliminated in the imperative: in contrast, the declarative version of the sentence above has several H*L- tunes.

I propose that the difference between the imperative and declarative is therefore not the tune, but instead the number of PPhs in an IP. In a declarative, there can be several. In the imperative there is only one, and its head is the rightmost PrWd.

I suggest that the phonological motivation for having one PPh derives from the imperative morpheme, which is an H* that requires that it both be right-aligned, and attach to the head of an intonational phrase. Coupled with the requirement that the left edge of the head PPh be aligned with the left edge of the IP, effectively only one PPh can occur.

2.4 Interrogatives

To clarify the intonation of interrogatives in RSA, the same sentence is provided in a question form in pitch track (3).



(3). {[ra:.mi]} {[ʤa:b]} {[ʔal]} {[mo:.jah} {[ʔal]} {[za:.nah]}
(N) Rami brought the water the good
'Rami brought the good water?'

Questions in RSA share the same SVO form of sentences. The difference between a declarative and an interrogative is signaled by the intonation. The above figure shows that the last word in questions has the intonation H*H-L%. This contrasts with statements, which end in H*L%.

The reasoning behind the claim that there are two H's in the final word is as follows. The final H pitch target is extremely high – much higher than all previous H*s. This only makes sense if it is preceded by a H and its excessively high pitch is due to a phonetic process of upstep (Gussenhoven 2006).

Late realization is more noticeable in the above pitch track in the last word [za:.nah]. The H tone of the first stressed syllable [za:] is realized on the following syllable [nah], which does not carry stress.

3. Analysis

This section of the paper presents a phonological explanation of the intonational tune structure in RSA. I investigate the constraints that account for syllable stress, word stress, phrase stress, sentence left H% tone, L tone at end of word/phrase, question morpheme, the OCP, and prosodic structure.

3.1 Every stressed syllable has a H tone: (HEAD=T)

In RSA, every stressed syllable has a H. A constraint that helps account for this is HEAD=T, which requires every prosodic phrase head to have a tone (adapting Yip 2006). This constraint outranks DEP-T, which prohibits tone insertion. An example is given in tableau (4).

The head's tone is H because of the constraint *HEAD/L "A violation is assigned for each occurrence of a low toned foot head (i.e. stressed syllable)" (de Lacy 2006). Tableau (4) below illustrates the ranking of *HEAD/L along with HEAD=T and DEP-T.

(4) HEAD=T »DEP-T

/dʒa:b/	HEAD=T	*HEAD/L	DEP-T
(a) dʒa:b	*!		
☞ (b) dʒa:b H			*
(c) dʒa:b L		*!	*

As shown in tableau (4), candidate (b) wins because the stressed syllable is assigned a H tone and only violates DEP-T, whereas the other candidates violate higher-ranked constraints. Although candidate (b) violates DEP-T, it still wins because the constraint HEAD=T outranks DEP-T. Therefore the ranking is HEAD=T » DEP-T. Candidate (b) violates DEP-T once by having an inserted H tone at the end of the word and thus wins over candidate (a). As for candidates (c), it violates *HEAD/L and DEP-T. Candidate (c) violates *HEAD/L by having a L tone on the head foot syllable.

3.2 Every sentence has a H tone at the left edge

Another phenomenon in RSA is that a H tone is required at the left edge of each sentence. To account for the left edge H tone, I use a constraint ALIGN-L(UtteranceP, H), which requires the left edge of every utterance to be aligned with a H tone (adapting McCarthy & Prince 1993). This constraint outranks DEP-T, which does not allow tone

insertion. Tableau (5) below shows that DEP-T is violated by the constraint ALIGN-L(UtteranceP, H) to keep a H tone at the left edge of the sentence.

(5) ALIGN-L(UtteranceP, H) » DEP-T

/ʕáli ʕára/	ALIGN-L(UtteranceP, H)	DEP-T
H*L⁻ H*L⁻ (a) ʕáli ʕára	*!	* * * *
L%H*L⁻ H*L⁻ (b) ʕáli ʕára	*!	* * * * *
☞ H%H*L⁻ H*L⁻ (c) ʕáli ʕára		* * * * *

In tableau (5), candidate (c) wins because it alone does not violate ALIGN-L(UtteranceP, H). Candidate (a) fails to win because it crucially violates ALIGN-L(UtteranceP, H) by not having a H tone at the left edge of the phrase. The first H* is attached to the first stressed syllable, and not to the leftmost segment. Candidate (b) has a L% tone at the left edge, again violating ALIGN-L(UtteranceP, H).

3.3 Every phrase/ word has a L tone at the right edge

In RSA every utterance has to end with a L tone. This generalization includes words and phrases. A phrase has to have a L tone at its right edge boundary and a L tone at the right edge of each word in that phrase as well. To ensure having this pattern of intonation, we need a constraint that complies with this condition. The constraint ALIGN-R(PPhrase, L) requires that a L tone is aligned to the right edge of each word or phrase and thus assigns a violation for each word or phrase that have a H tone at the right edge. This constraint out ranks DEP-T. A comparison example of how this constraint works is given in tableau (6) below.

(6) ALIGN-R(PhraseP, L) » DEP-T

/ʕáli ʕára/	ALIGN-R(PPhrase, L)	DEP-T
H* L⁻ H*L⁻ ☞ (a) /ʕáli ʕára/		* * * *
H* H⁻ H*H⁻ (b) /ʕáli ʕára/	* *!	* * * *
H* H* (c) /ʕáli ʕára/	* *!	* *

In tableau (6), candidate (a) wins because it satisfies ALIGN-R(PPhrase, L). Candidate (b) did not win because it violated ALIGN-R(PhraseP, L) by having a H tone at the right edge of the utterance. In (d), the candidate violates DEP-T by inserting a L tone at the right edge. Although candidate (d) does not violate ALIGN-R(PPhrase, L), it does not win because it has violated DEP-T, which does not allow tone epenthesis.

3.4 A question constraint: ALIGN-R(Question morpheme, Utterance)

The last phonological phrase of a question ends with a H*H*L% intonation. The constraint HEAD=T account for the H tone at the beginning of the word and the constraint ALIGN-R(PPhrase, L) accounts for the L tone at the end of the word. As for the added H tone just before the L boundary tone, the constraint ALIGN-R(Question morpheme, Utterance) accounts for this phenomenon. ALIGN-R(Question morpheme, Utterance) aligns the question morpheme – which is a H tone – to the right edge of the boundary word in questions. Therefore, a violation of this constraint occurs if the question morpheme is not aligned to the right of the utterance in questions. I will give an illustration to how this morpheme by comparing it to some of the constraints we examined so far. Consider tableau (7).

(7) ALIGN-R(Question morpheme, Utterance) » DEP-T

Ali ran Ques. /ʕáli ʕára H/	MAX-TONE	ALIGN-R(PhraseP, L)	ALIGN-R(Question morpheme, Utterance)
(a) H*L⁻H*L⁻ ʕáli ʕára	*!		
(b) H*L⁻H*H⁻ ʕáli ʕára		*!	
☞ (c) H*L⁻H*HL⁻ ʕáli ʕára			
(d) H*L⁻H*LH⁻ ʕáli ʕára		*!	

In tableau (7), candidate (a) violated MAX-T, which assigns a violation every time a tone is deleted (Myers 1997). Candidate (b) violated ALIGN-R(PhraseP.L) by having a H tone at the right edge of the phrase. Candidate (c) wins because it does not violate any of the constraints. Although (c) alters the tone, it still wins because the added question morpheme is ranked higher than DEP-T: ALIGN-R(Question morpheme, Utterance) » DEP-T. In (d), a violation of ALIGN-R(PhraseP, L) occurs by having a H tone at the right edge of the phrase.

3.6 Interaction between Tone and Stress

There are two fundamental points that illustrate the interaction between tone and stress is RSA. These two points are (I) the interaction between the OCP and the constraint*HEAD/L. Another interaction (II) between stress and tone is the interaction between the constraint ALIGN-R(PhraseP, L) and ALIGN-R(Question morpheme, Utterance).

(I) In regard to the OCP (Obligatory Contour Principle), which does not allow two adjacent identical tones, RSA seems to violate this constraint freely as seen in the last word of a question, having two adjacent H tones before a L^- phrase boundary tone. This situation is justified by using the constraint *HEAD/L. Therefore, *HEAD/L is highly ranked in relation to OCP, resulting in having *HEAD/L outranks the OCP; *Head/L » OCP.

(II) The reason that questions do not end in H*LH is that the constraint ALIGN-R(PhraseP, L), mentioned before, outranks ALIGN-R(Question morpheme, Utterance). Having the constraint ALIGN-R(Question morpheme, Utterance) requires that a question H morpheme should be aligned to the right of an utterance. This constraint will assign a H tone at the end of an utterance. However, the constraint ALIGN-R(PhraseP, L), which requires that a L tone should be aligned to the right of a phrase, outranks ALIGN-R(Question morpheme, Utterance). Consequently, when both constraints interact, a question ends with a H*HL%, due to ALIGN-R(PhraseP, L) outranking ALIGN-R(Question morpheme, Utterance); ALIGN-R(PhraseP, L) » ALIGN-R(Question morpheme, Utterance).

4. Conclusions

This paper has given a preliminary phonetic and phonological analysis of the intonation of the Riyadh Saudi Arabic dialect of Arabic. A number of sentences and questions were examined and a representative pair of each was given above illustrating the basic intonation in declaratives, imperatives, and interrogatives. Section 2 gave a brief description of the methodology used in determining the intonation patterns in the utterances. It also showed how questions add a morpheme at the end of phrases and explain the prosodic structure of phonological phrases. A brief phonological analysis accounting for the tone structure in the utterances using Optimality Theory was also provided.

In further research, I will investigate some more complex forms. For example, I will investigate sentences with many words in a noun phrase, complex sentences, such as ones with subordinate clauses, or ones with different prosodic structures. I will seek other innovations in relation to the phonology and phonetics in RSA and other types of structures in Arabic and other dialects of Saudi Arabic.

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