The Intonational Grammar of Persian
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This paper presents a model of the intonational phonology of Persian (or Farsi), a stress-accent language (Jun 2005), based on 2112 utterances read by a total of 8 native speakers. It also studies the intonation patterns of different sentence types. The work is done in the autosegmental-metrical framework of intonation (Pierrehumbert 1980, Ladd 1996).

In the proposed model, the smallest prosodic unit is the Accentual phrase (AP), having the pitch accent L+H*, which is associated with the stressed syllable. There are two allophones for this pitch accent, the L+H* itself and H*. The former is used for words or phrases with final stress and vocatives, and the latter is reserved for initially-stressed words and monosyllabic content words.

A boundary tone marks the right edge of an AP and handles the part of an AP between the pitch accent and the AP end. This part can consist of zero syllables (when the stressed syllable of an AP is its final syllable), in which case the boundary tone is realized on the stressed syllable itself. It can also consist of several syllables, in which case the boundary tone includes all these syllables up to the AP end. This boundary tone can be high (h) or low (l). In most simplex sentences, the final AP, which carries the nuclear pitch accent (NPA), has a low boundary tone, and the ones before it all have a high boundary tone, but in echo questions, double-focus constructions, and vocatives, the NPA AP may have a high boundary tone. Such is also the case in compound and some types of complex sentences.

One or more Accentual Phrases are immediately dominated by an Intonational Phrase (IP), which corresponds to an utterance for simplex sentences. An IP is phonologically marked by a right boundary tone L% or H% on the (part of) the final syllable. L% is used for declaratives ((S)(O)V or scrambled), leading yes/no questions, single and multiple WH-questions, alternative questions, imperatives, and vocatives. H% is used for yes/no questions, tag questions, echo questions, the pre-conjunction clause of coordinate structures, and IP-forming subordinate clauses.

The proposed prosodic system is less complicated than previous proposals which suggest an additional phrase accent for Persian (Mahjani 2003, Scarborough 2003). I argue that the AP boundary tone can in all instances account for the part of the F0 contour following the NPA, i.e., the part that the phrase accent is supposed to associate with. Thus, the following two situations do not occur after the NPA AP in Persian: a low AP boundary tone followed by a high stretch and a high AP boundary tone followed by a low plateau.

Persian prosodic structure is exemplified below.

(1) miná   milán-æm   mí-mun-e   čænd   ruz.
     Mina   Milan-too   PREFIX-stay-3SG a few   day
     'Mina stays a few days in Milan too.'
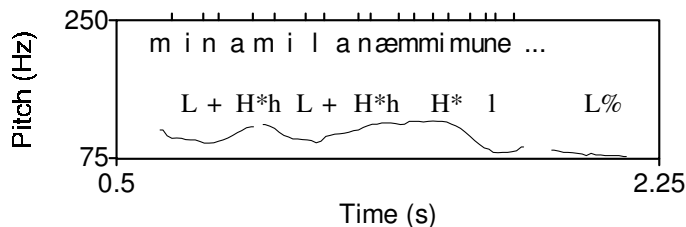
In (1), there are three APs corresponding to the noun Mina, the adverb Milan and its clitic *–æm*, and the verb. The first two carry the pitch accent L+H*, and the initially-stressed verb (*mi-mun-e*) bears the H* allophone. The first two APs are high-boundary-toned and the last is the nuclear AP and low-boundary-toned. The declarative is realized as one IP (and one utterance) marked by L%, indicating that it ends low with no pitch change involved. Everything following the NPA is deaccented up to the IP end, so there is no tonal event in the phrase *čænd ruz*.

An Accentual Phrase normally consists of one content word with its possible clitic(s), but this configuration may be affected by factors such as information structure (example (2)), speech rate, focus, length, and subordination.
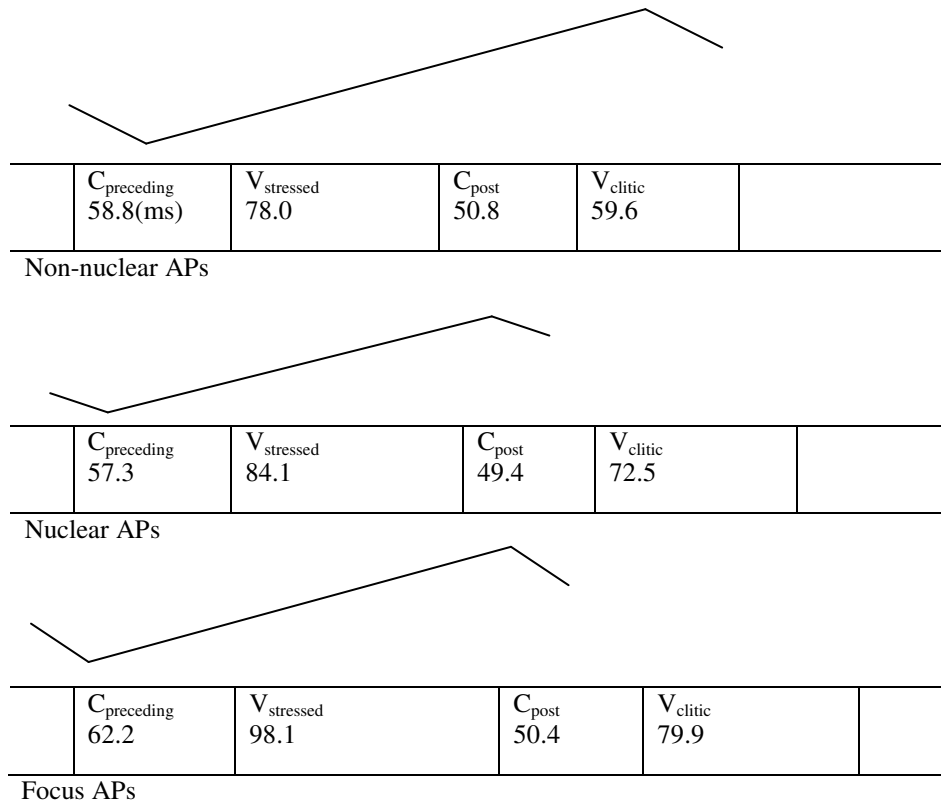
(2) mærdom-e   inja xeyli mehræbun-æn.
     people-LINKER   here very kind-are
     'The people here are very kind.'
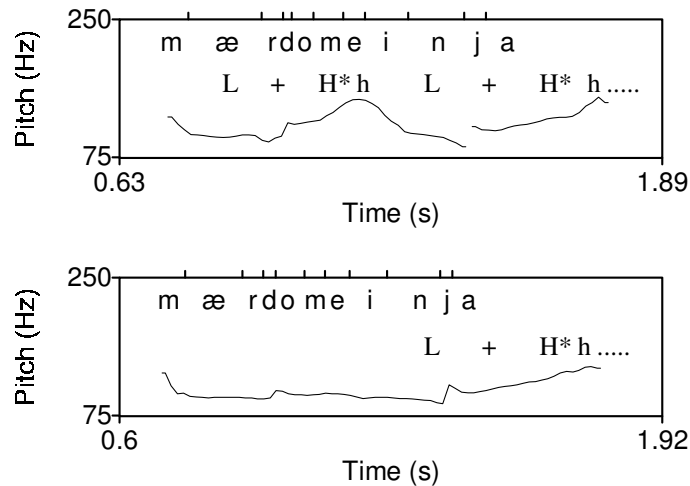
In the first version, the noun phrase is new information and shows two rises. In the second, it is given information (e.g., used in response to the question 'How do you find the people here?'), hence realized as one AP. In such cases, i.e., where the L of an AP is realized on several syllables before the H*, a low plateau is formed (on *mærdom-e in-* in the above example) which is the result of the spreading of the L to the left up to the beginning of the AP.

Several types of vocatives are studied in the paper. They are all characterized by a rise with the high aligned with (or slightly before) the second syllable (monosyllabic names are rare and usually not used in calling). After the peak, there is either a slight stepdown (ordinary, anger, and chanted calls) or a gradual lowering (surprise calls), both of which are handled by the AP boundary tone, high in the former and low in the latter. The call types show phonetic differences, e.g., anger and surprise calls have more pitch excursion than ordinary and chanted calls, and chanted calls are the longest followed by surprise calls.

Contrastively-focused APs cause deaccentuation to the utterance end and are phonologically the same as ordinary ones but are phonetically different. The next figure compares the alignment of cliticized L+H* APs in non-nuclear (h-boundary-toned), nuclear (l-boundary-toned), and contrastive focus APs.

C$_{preceding}$ 58.8(ms)	V$_{stressed}$ 78.0	C$_{post}$ 50.8	V$_{clitic}$ 59.6	

Non-nuclear APs

C$_{preceding}$ 57.3	V$_{stressed}$ 84.1	C$_{post}$ 49.4	V$_{clitic}$ 72.5	

Nuclear APs

C$_{preceding}$ 62.2	V$_{stressed}$ 98.1	C$_{post}$ 50.4	V$_{clitic}$ 79.9	

Focus APs

The duration of the focus AP is more than that of the other two. This difference is caused only by vowels. The L is always aligned in the consonant preceding the stressed vowel but is significantly earlier in the focus type. The alignment of H is determined by the AP boundary tone: if it is high, the H is aligned in V$_{clitic}$, and if it is low, the H is aligned in C$_{post}$. The former is significantly later than the latter. The pitch excursion of the nuclear type is significantly less than the other two, caused only by the different highs.

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