

## Pitch accent alignment in Cairene Arabic: more evidence for cross-linguistic variation.

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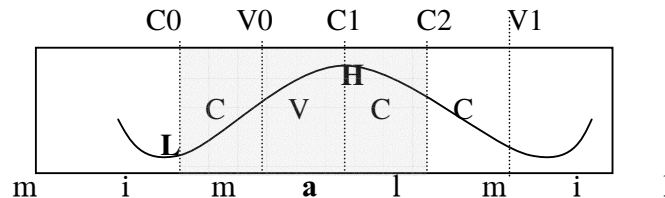
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Building on a significant body of research into the alignment properties of L (valley) and H (peak) turning points in pre-nuclear pitch accents (Prieto et al 1995, Arvaniti et al 1998, Ladd et al 1999, Ladd et al 2000), Atterer & Ladd (2004) demonstrated that in German the exact alignment of L varies from that observed in other languages, and further that there is a marked difference in the alignment properties of L between German dialects. Using similar methodology, this paper investigates the alignment properties of CA pitch accents for the first time, with similar results: whilst CA is 'like' English, Greek etc in showing clear alignment of both pitch targets to landmarks at the edges of the stressed syllable, the exact alignment facts are slightly different from that observed elsewhere, and comparison to Chahal's (2001) investigation of Lebanese Arabic (LA) shows variation in alignment between Arabic dialects.

Stress-medial trisyllabic target words (eg [mi'malmil]) were placed medially in carrier sentence frames and each sentence read three times by 15 speakers of CA (15 x 3 x 6 = 270 tokens). Auditory transcription and labelling was carried out by the author with reference to spectrogram and F0 contour extracted using Praat 4.2. 32 tokens were excluded due to either disfluency or insertion of a phrase boundary after the target word, leaving a corpus of 238. Pitch events and key segmental landmarks in each target word were labelled as shown in Figure 1: C0 (start of consonant of stressed syllable); V0 (start of stressed vowel); C1 (end of stressed vowel); C2 (start of second consonant of intersyllabic cluster); V1 (start of following vowel); L (pitch valley turning point); H (pitch peak). Alignment of the start of the pitch rise is assessed by calculating the position of L relative to C0 and V0, and of the pitch peak by calculating the position of H relative to C1, C2 and V1 (ie L-C0, L-V0, H-C1, H-C2, H-V1).

Figure 1



Comparison of means among these variables indicates that between C0 and V0 L is most closely aligned with C0, the onset of the stressed syllable ( $H_0: L-C0=0$ ;  $p=0.161$ ). Peak (H) alignment across all targets is not clear due to difficulty in identifying the exact position of C2 (internal boundary of the consonant cluster) in three of the six target words; when these are excluded H alignment becomes apparent and is to C1, the end of the stressed vowel ( $H_0: H-C1=0$ ;  $p=0.600$ ). Across all targets however there is a strong correlation between peak delay (H-C0) and syllable duration (C2-C0):  $R^2 = 0.333$ ,  $p < 0.01$ . Mean values for L-C0 and H-C1 (8.71ms and 6.01ms respectively) reveal that in CA L is aligned just after the onset of the stressed syllable, and H is aligned just after the end of the stressed vowel. In CA then, both L and H alignment is similar to that reported in Mexican Spanish, Dutch and English.

Due to the quantity-sensitive nature of Arabic stress assignment however, the medial stressed syllables explored here are necessarily closed (CV.CVC.CVC), not open syllables as studied in other languages. Calculation of 'relative peak delay' (peak delay/syllable duration) enables comparison with results reported for LA closed syllables in Chahal (2001) and reveals that in CA H is aligned earlier than in LA, whose alignment is closer to that of eg Greek or German (LA:  $rpd > 1$ , H outside the stressed syllable; CA:  $rpd < 1$ , H inside stressed syllable).

CA provides fresh evidence not only for alignment of pitch targets to *both* edges of the stressed syllable but also for a finely-grained typology of exact phonetic alignment of targets.

References:

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