

## Temporal Coordination and Sonority of Jazani Arabic Word-Initial Clusters

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In some Arabic dialects, such as Moroccan, Najdi and Jazani Arabic, there can be word-initial consonant clusters. The syllabic organization of these clusters is a contested issue: Benhallam (1980) argues that word-initial consonant clusters in Moroccan Arabic form complex onsets, whereas Boudlal (2001) claims that they contain simplex onsets. This paper aims to tease apart these two possibilities for Jazani Arabic, a previously unstudied dialect of Arabic, spoken in the Jazan Province, Saudi Arabia, by focusing on the temporal coordination patterns of word-initial consonants. Jazani Arabic allows various types of word-initial sequences with rising, falling and equal sonority, e.g., [sməʕ] ‘listen’, [nzɛl] ‘get down’, [nmosʕ] ‘pluck’, which do not all conform to the Sonority Sequencing Principle (SSP) (Clements, 1988; Selkirk, 1982). We show that Jazani Arabic word-initial clusters consistently exhibit a simplex onset organization regardless of the different sonority profiles.

Previous studies have shown a correlation between the syllabic parse of consonant clusters and their temporal organization (Browman & Goldstein, 1988; Byrd, 1995). Such studies typically compare three different durational measurements from the end of the following vowel (*anchor*) to the mid-points for: (a) the left-most consonant in the initial cluster (*left edge*), (b) the plateau for all the consonants in the initial cluster (*c-center*), (c) and the right-most consonant in the initial cluster (*right edge*). While Browman & Goldstein (1988) showed that the *c-center* intervals are more stable for English, Shaw et al. (2011) showed that the *right edge* intervals are more stable in Moroccan Arabic. This has been taken as evidence that languages with a simplex onset organization have more stability of the *right edge* to *anchor* interval, and languages with a complex onset organization have more stability of the *c-center* to *anchor* interval (Shaw et al., 2011). Furthermore, Selkirk & Durvasula (2013) replicated previous results through acoustic measurements by showing that English has more stability in the *c-center* to *anchor* interval.

Using acoustic measurements, our study investigated (i) whether the initial clusters in Jazani Arabic have complex or simplex onset organization, and (ii) whether initial clusters that conform to or violate the SSP differ in syllabic organization. Seven native Jazani Arabic speakers were recorded, producing 6 randomized repetitions of target words embedded in a carrier phrase. There were 78 target words (34 real + 44 nonce) that varied in the number of initial consonants, i.e. singleton and biconsonantal, e.g. [məʕ] ‘with’, [sməʕ] ‘listen’. Using Praat scripts, three durational measurements were calculated: the midpoint of the leftmost consonant to the end of the vowel (*left edge*), the midpoint of the rightmost consonant to the end of the vowel (*right edge*), and midpoint of the consonant sequence to the end of the vowel (*c-center*). [Note: in words with a single word-initial consonant, the same midpoint of the only consonant determines all three durational measurements.] The measurements (from the *left-edge*, or the *c-center*, or the *right-edge*) that show the least variation can be inferred to be the most stable. For this purpose, Relative Standard Deviation (RSD) is a useful metric to index stability, as it controls for the bias that shorter durations tend to have less variability.

Figure 1 presents the RSD values for the *right-edge* to *anchor*, the *c-center* to *anchor*, and the *left-edge* to *anchor* intervals, showing that the *right edge* interval has the lowest RSD values for all the words; thus, it is the most stable interval. This suggests that Jazani Arabic initial clusters have a simplex onset organization. Figure 2 illustrates that clusters with different sonority profiles show the same pattern across the three intervals, suggesting that initial clusters with different sonority profiles behave similarly, as simplex onsets.

In conclusion, this study shows (i) that Jazani Arabic word-initial clusters have a simplex onset organization, a temporal pattern similar to that of Moroccan Arabic rather than English, and (ii) that there is no violation of SSP in Jazani Arabic consonant combinations since the

first and the second consonants of the word-initial clusters do not belong to the same syllable; e.g., the word [nzɛl] ‘get down’ is parsed as [n.zɛl] with the first consonant assumed to be extrasyllabic. Furthermore, the results support the view that temporal coordination patterns can serve as important cues to understand the syllabic organization of languages where the syllabic parses are controversial. Finally, in terms of methodology, acoustic measurements are an effective (indirect) tool to examine syllable-based temporal organizations of gestures.

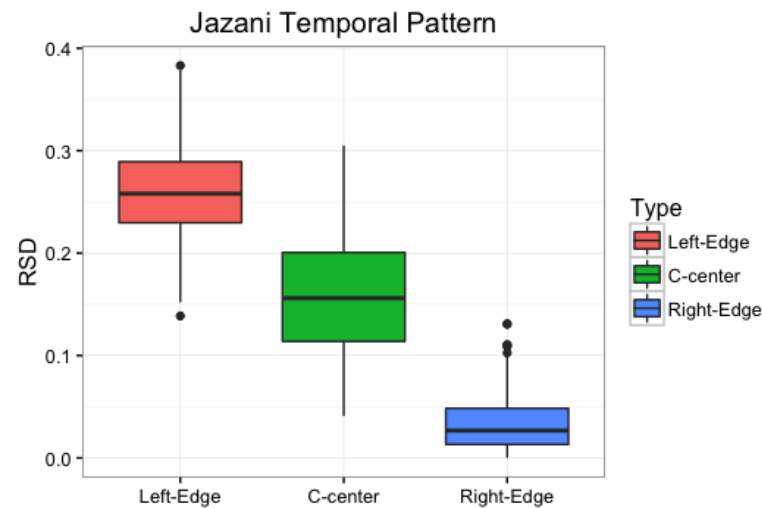


Figure 1 Boxplots for RSD values of the three intervals for all speakers.

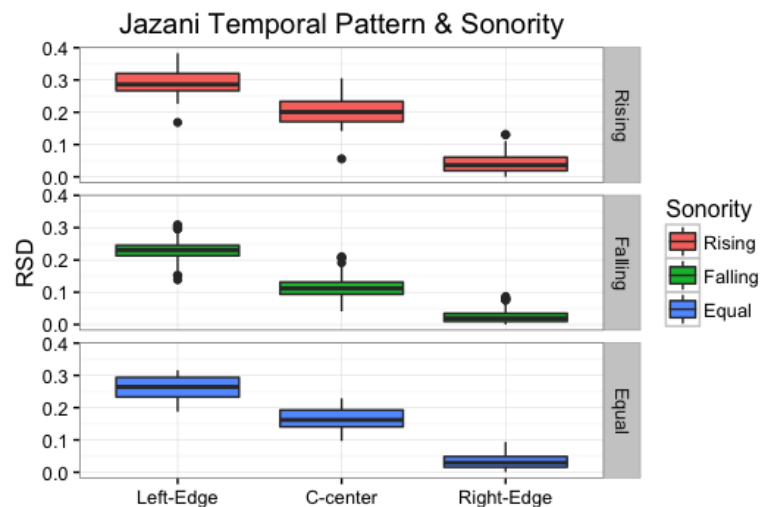


Figure 2 Boxplots for RSD values of the three intervals across the sonority profiles.

### Selected References

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