TEMPORAL COMPENSATION FOR SEGMENTAL TIMING IN ARABIC AND JAPANESE

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Temporal compensation may be viewed as the response of the temporal micro-structure of speech (segmental timing) to such macrostructural constraints as constant syllable or word durations. If this hypothesis is correct, we should predict different patterns of temporal compensation in languages with different rhythmic structures.  Indeed, study of temporal compensation can be used to illuminate the temporal macrostructure itself.  We conducted two similar experiments in Japanese (often cited for regularity of timing) and in Arabic to investigate the compensatory effects of changing the manner and voicing of apical consonants spanning a wide range of constriction durations.

In relevant portions of the Arabic experiment, medial /t,d,r/ in test words were measured in carrier sentences along with preceding and following vowels and the VOT of the initial /k/. Results showed that the voicing change from /t/ to /d/ lengthened the preceding vowel and even VOT, but did not significantly affect either the stop closure itself or the following vowel.  The change from /d/ to /r/ resulted in a shorter consonant closure and also in compensatory lengthening of the preceding vowel.

In the comparable experiment on Japanese, two-syllable test words were read in carrier sentences and the durations of all segments in the words measured.  Here it was found that /t/ > /d/ > /r/ and all other segments in the test word varied inversely such that total test word durations were the same ± 2%.

These results support the traditional observation of highly regular timing in Japanese but show that the domain of temporal compensation for inherent segmental effects is neither the CV nor VC but rather includes at least two syllables spreading in both directions.  Arabic, on the other hand, exhibits far less evidence of temporal compensation and may lack the kind of macrostructure that requires the support of temporal compensation.

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