The role of temporal structure in segmental stability

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One index of the instability of a speech percept is the degree of systematic bias in its imitation (conversely, stability is indicated by a lack of bias). Since stability and perceptual invariance are closely related, factors which influence stability may offer insight into the nature of speech categories. Previous work (Vallabha & Tuller, 2001) has shown that imitations of isolated vowels are highly unstable: while variability around the mean imitation can be well modeled as low-level perceptual noise, there is a strong bias that cannot be ascribed to either perceptual or articulatory noise. We examine whether embedding the vowel in a temporally structured sound such as a syllable induces the vowel to become more stable (i.e. exhibit less bias in imitation), potentially through assimilation to a temporally structured prototype. Each subject first imitated three kinds of synthetic sounds (diphthong-like vocalic glides, /dV/ syllables, and isolated vowels) in which the formants of the synthetic vowel were systematically varied. These imitations served as the self-produced targets for each subject, who then reproduced them in either a multiple or a serial-reproduction condition. We compare the bias and variability of imitations in the isolated-vowel and structured-sound conditions, and discuss the implications for the stability of embedded vowels. [Supported by NIMH Grants MH19116 and MH42900.]