

A method for determining vowel and consonant contributions  
to the time-varying vocal tract shape  
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A method has been recently developed with which a vowel-consonant-vowel (VCV) utterance based on X-ray microbeam articulatory data can be separated into a vowel-to-vowel transition and a consonant superposition function [Story, J. Acoust. Soc. Am., 126, 2009]. The result is a model that represents a vowel sequence as a time-dependent perturbation of the neutral vocal tract shape governed by coefficients of canonical deformation patterns. Consonants are modeled as superposition functions that can force portions of the vocal tract shape to be constricted or expanded, over a specified time course. The purpose of this study was to apply the method to a wider variety of consonant and vowel contexts than were previously reported. The specific aims were to analyze X-ray microbeam data produced by one male speaker for three stop consonants [p,t,k] embedded in six vowel contexts [ia, ai, oae, aeo, ii, aa] and reconstruct them as separate consonant and vowel component. When superimposed, these were shown to be reasonable approximations of the original VCVs, as assessed qualitatively by visual inspection, and quantitatively by calculating RMS error and correlation coefficients.