There are a number of hypotheses about the basic control units of tongue movement. These include dividing the tongue into a tip and body that execute quasi-independent motions, and representing the tongue with two or three factors that capture tongue contour shape. Recently there has been evidence that higher dimensional representation for the tongue, in the form of functional segments, may be warranted. The tongue, a deformable object, moves by compressing and expanding local functional segments. For any single gesture, the various functional segments may move in similar or opposite directions to compress or expand the tongue locally. High correlations between tongue segments would suggest biomechanical constraints between segments and low correlations would suggest active independent control of these segments. This paper examined five tongue segments, from front to back in the tongue, for degree of independence in the production of speech, using ultrasound and tagged Cine-MRI. Results showed physiological constraints in segmental motion in the form of high positive correlations between adjacent segments and high negative correlations between distant segments. Linguistic constraints were also observed as segmental correlations changed with the phonemic content of the task.