Events occurring in one sensory modality can often affect how we experience sensations in a different sensory modality. For instance, the sound of a mosquito flying near us seemingly enhances sensitivity to touch on our skin. In this talk, I will describe a series of experiments that examines multisensory interactions between audition, touch, and vision, as well as some of the neural substrates underlying them. In addition to describing psychophysical experiments that have revealed some of the systematic ways in which one sensory modality influences another, I will discuss experiments using diffusion tensor imaging (DTI) and functional magnetic resonance imaging (fMRI) that were conducted in neurologically normal subjects as well as on a patient who has a unique form of acquired auditory-tactile synesthesia - the patient experiences somatosensory sensations on her body in response to sounds after a small thalamic lesion. Finally, I will present some preliminary electrocorticography (ECoG) data that shows distinct patterns of neural activity in response to audiovisual speech. Together, these studies illustrate some of the dynamic interactions between our different sensory systems, the neural mechanisms underlying these interactions, and also highlight the plastic properties of sensory processing in the human brain.