In recent years, there has been an increasing use of functional neuroimaging techniques to help improve our understanding of the brain regions involved in a variety of cognitive, sensory, and motor tasks. Specifically, we have been using positron emission tomography (PET) to study the relationship between auditory perception and cortical activation during discrimination tasks involving complex auditory stimuli. In this presentation, we will review results from two projects that have demonstrated dynamic cortical activation patterns that are dependent on both the detailed features of the sensory input as well as the cognitive demands of the discrimination task.