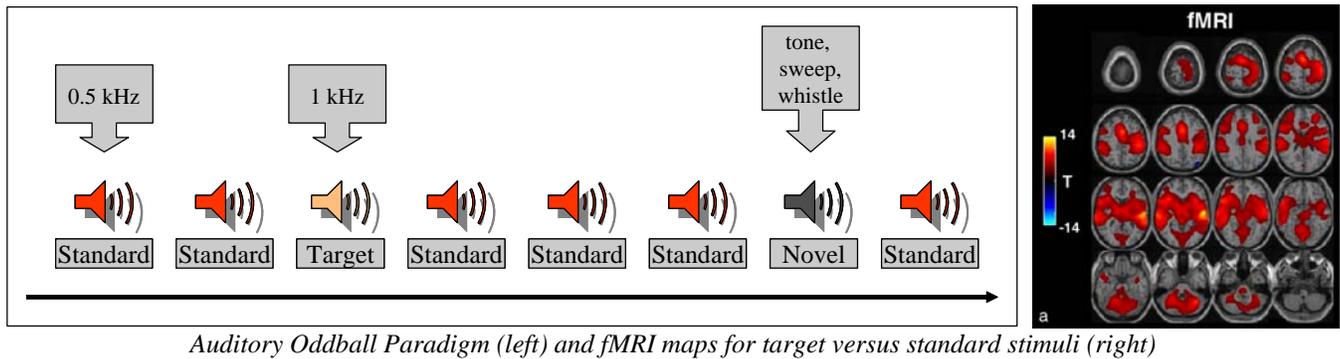


**MLSP 2006 Competition:**  
Processing of Functional Magnetic Resonance Imaging Data  
Auditory Oddball Task

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## 1. Introduction

Functional Magnetic Resonance Imaging (fMRI) data shows localized hemodynamic changes related to neuronal activation. A 3D image is collected every few seconds during the performance of a task. The task timing information can be used to analyze the fMRI data. For this competition data set, you are asked to analyze data collected during the performance of an auditory oddball task. Data from two different runs (which are typically averaged together) are provided along with the paradigm timing files for each run. The auditory oddball task is a paradigm in which infrequent, task-relevant target 'oddball' stimuli are interspersed with infrequent task-irrelevant novel stimuli and frequent standard stimuli.



A picture of the auditory oddball task and a target time-locked average is presented above. Typical approaches to pre-processing these data include motion correction, spatial normalization to a template, and spatial smoothing. Identification of activated areas is typically done by creating three time series regressors (one for each of the behavioral variables above) and possibly their temporal derivatives, and fitting these to the time series for each position (voxel) of the image. Often low frequency drift nuisance terms are modeled or filtered out as well.

## 2. Performance Metric

The goal of this question is to promote new (original) processing algorithms for functional imaging data and is meant to be an opportunity for creativity. There is no specific performance metric; rather, submissions will be gauged based upon their 1) creativity, 2) ability to provide insight into the data provided (e.g. regions activated by the stimuli, regions that are correlated, segregation of variance into specific interpreted categories), 3) ability to provide a sense of the robustness of the algorithm, and 4) utilization of both spatial and temporal information.

## 3. Data

The data is contained at <http://www.nrc-iol.org/mialab/results.htm>. One data file and a behavioral file should be downloaded. There are two data formats provided, Analyze (the Analyze format can be read by MRIcro <http://www.sph.sc.edu/comd/rorden/mricro.html>) and Matlab. Two runs were collected. For each run there are 249 files numbered \*007.img through \*255.img (files in '1' and '2' directories). The stimulus timing files are provided in a separate ASCII file for each run of target (TRG\_PR\_1\* & TRG\_PR\_2\*), novel (NOV\_OM\_1\* & NOV\_OM\_2\*), & standard (STD\_OM\_1\* & STD\_OM\_2\*) stimuli. The timing in the stimulus timing files is in units of scans (so a 0 would mean that a stimulus occurred during the first scan, i.e. 007\*.img). For this experiment, the TR (duration of each image in time) is 1.5 seconds, the number of voxels are x=64, y=64, z=29 and voxel dimensions are 2mm x 2 mm x 5mm. If more details are desired, please contact Vince.

## 4. Submissions

Submissions should be in the form of a Matlab \*.mat file that contains image(s) of the interesting activations/output. If desired, time series plots may be provided as well. The e-mail should contain either the \*.mat (zipped) as an attachment or a URL from which the data can be obtained (the latter is preferred for large files). In addition, the email should include a one page description of the approach used and why the activations/time courses sent are of interest.