Name: _____

Total: / 29

Session 6 assignment

Due by: 02/24/16 start of lab, printed OR e-mail (to: bauera@cmu.edu)

(Use subject heading with "brain imaging lab" in it)

Purpose: To introduce you to doing multi-voxel pattern analysis (MVPA), to experimenting with parameters that affect its output, and to interpreting the output. Also, to demonstrate how MVPA and GLM analysis can differ

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1) The usefulness of MVPA when little to no significant GLM activation difference is found

a) ***[6 pts.]*** Select, from *only* the below three object categories, the *single most* suitable object category for doing MVPA, given the GLM activation differences that you observe using xjview (looking at *both* positive and negative differences). The contrast images are already generated and are located in the session6 folder. In xjview set cluster size = 10, Display intensity: All, pValue: 0.005, and check Render View: Old

The three categories: [Vehicles, Building-parts, Insects] ← There is a most suitable choice

In the table below, *first indicate the one object category that you chose* (first row). Then, run classification using 50 voxels from a lobe where there is little to no GLM activation difference. Report the classification accuracy for your chosen object category *only*. Then, run classification using 50 voxels from the occipital lobe; report the accuracy for your chosen object category only.

Your chosen object category →		
GLM activation difference in lobe	**Lobe in which you are selecting voxels**	**Classification accuracy for your object category (use 50 voxels each time)**
Little to none		
--	Occipital	

b) ***[3 pts.]*** Consider your chosen object category and its prominent, salient features, which typically are most important to defining it. With respect to this consideration, speculate why the classification accuracies for your object category are different between the occipital lobe and the lobe that you chose. If they do not differ (only ~2% difference), speculate why.

<Your answer here…>

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c) ***[3 pts.]*** Give another possible reason that the classification accuracies are different between the occipital lobe and the lobe that you chose, but this time *not* in terms of object concept meaning. [Hint: Think about how experimental procedure;] However, if your classification accuracies are *not* different, give another possible reason that they are not different.

<Your answer here…>

2) How classification accuracy changes as a function of the number of voxels

a) ***[4 pts.]*** Run classification using voxels from anywhere in the brain *except* the occipital lobe (this is an option to choose in the "modifyMeOnly.m" file). In the table below, for each no. voxels that you use for classification, enter the resulting classification accuracy for "all" object categories combined (top of the MVPA report display in MATLAB). There should be a clear change in classification accuracy as a function of no. voxels.

No. voxels	5	10	30	50	70	80	90	100
Classification accuracy for "all"								

b) ***[3 pts.]*** Describe the change in the classification accuracy as a function of voxel number. Speculate why this change occurs in terms of the object concepts and their neural representations.

<Your answer here…>

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c) ***[3 pts.]*** Does the change in classification accuracy show signs of *reversing* itself after a certain no. voxels? Play with larger nos. voxels to see what happens to the classification accuracy. If there is a reversal, report a few sequential numbers of voxels and their associated classification accuracies to illustrate the reversal in the change. Then speculate what this reversal means in terms of the object concepts and their neural representations. If the change in classification accuracy does *not* reverse itself, speculate why not.

<Your answer here…>

3) How classification accuracy changes as a function of the number of possible participating brain areas

a) ***[4 pts.]*** Run classification using 50 voxels for the frontal, temporal, and parietal lobe *separately*. Also run classification using 50 voxels drawn from *any* of these three lobes (this option is "all lobes except occipital" in the "modifyMeOnly.m" file, which means the combination of frontal, temporal, and parietal lobes, without the occipital lobe). Report the classification accuracies for "all" in the below table.

	Frontal lobe	Temporal lobe	Parietal lobe	All three lobes
Classification accuracy for "all" (use 50 voxels each time)				

b) ***[3 pts.]*** Which choice of voxel location produces the highest classification accuracy? Speculate why this is the case in terms of the object concepts and their neural representations.

<Your answer here…>

Name: _____

FYI: Expansions of AAL abbreviations in xjview	
L	*Left*
R	*Right*
Sup	*Superior*
Inf	*Inferior*
Mid	*Middle*
Ant	*Anterior*
Post	*Posterior*
Supp	*Supplementary*
Orb	*Orbital*
Oper	*Operculum*
Tri	*Triangularis*
Also: Heschl gyrus is the primary auditory cortex	