Name: _____

Total: / 21

Session 9 assignment

Due by: 03/30/16 start of lab, printed OR e-mail (to: bauera@cmu.edu)

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

Purpose: To determine to what extent neural representations of object concepts are similar across different people; and to explore what variables impact between-subjects classification accuracy

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1) Location-sensitive subject variability ***[3 pts.]*** For your pre-assignment exercise, you ran between-subjects classification using voxels only from the frontal lobe. The accuracies were generally quite low. Given what you know about frontal lobe functions, speculate why the accuracies were so low. Why would different people's brain activity differ so much here?

<Your answer here…>

2) Semantic factors of object concepts ***[5 pts.]*** Run classification using 50 voxels and put `voxelsID = 6` (this is *anywhere except occipital lobe*). In the answer box below, enter the mean accuracy over ALL object concepts and ALL subjects. (This corresponds to "MEAN_categry-by-MEAN_subj" in the MVPA report on your screen.) This accuracy should be greater than chance, in the 60% range. Then, state and explain which brain region is probably contributing the *most* to the greater-than-chance accuracy. Think about the object concepts that were used in the experiment and where they are represented in the brain.

[See **A Neurosemantic Theory of Concrete Noun Representation Based on the Underlying Brain Codes; Just et al., 2010**.]

Anywhere except occipital lobe accuracy:

<Your answer here…>

Name: _____

3) Relation between within- and between-subjects classification ***[7 pts.]*** Now put 80 voxels and keep `voxelsID = 6` and run the classification again. In the table below, for each subject ID indicated in the left column, report the between-subjects accuracy over ALL categories ("MEAN_categry" from the MVPA display on your screen).

Subject ID	Within-subject classification accuracy	Between-subjects classification accuracy
subject_3	55.28	
subject_5	54.83	
subject_8	52.57	
subject_9	54.95	

Below, speculate how a subject can have near-chance-level within-subject accuracy (~50%), while having higher between-subjects accuracy. (Remember that within-subject classification is run on each individual separately; and between-subjects classification is trained on all the other subjects and tested on a single left-out subject.) [Think about how much data is used for the two different classification analyses.]

<Your answer here…>

4) Different ways of accounting for between-subject neuroanatomical differences ***[3 pts.]*** We spatially normalized the subjects' brains and ran classification on the same set of voxels across subjects. But in general, do you think representational similarity analysis does a better job at assessing the similarity in neural representations between different people? Why or why not?

<Your answer here…>

Name: _____

5) Voxel size impacting between-subjects classification ***[3 pts.]*** In our analyses we used somewhat large voxels (3x3x6mm). If we had used smaller voxels, we might have gotten *higher* or *lower* between-subjects classification accuracy. Give one reason for possibly getting higher accuracy, and one reason for getting lower accuracy.

<Your answer here…>