

Name: \_\_\_\_\_

**Total: / 30**

## Session 8 assignment

Due by: 03/23/16 start of lab, printed OR e-mail (to: [bauera@cmu.edu](mailto:bauera@cmu.edu))

(Use subject heading with “brain imaging lab” in it)

Purpose: To introduce you to interpreting group-level GLM contrasts (versus single subject-level results), and to familiarize you with the free parameters that affect the results

### 1) Comparing single subject- to group-level results [6 pts. for (a), (b) each; 3 pts. for (c)]

First, generate the *vegetables* group-level contrast image using spm. As seen in slide 16, the *vegetables* contrast number is 23, so when you load the individual subject contrasts as done in slide 24 you will type `^con_0023.*` and you will set the directory to `vegetable_0023` as done in slide 23.

Then, separately examine both the group-level *vegetables* contrast and the single subject-level *vegetables* contrast using xjview (using the *same* parameters, e.g. *positive activation always*: see slide 35). The single-subject contrast is already created and is in the “session8” folder.

**1a)** Locate an activation cluster in the single-subject contrast that is *NOT* in the group contrast, and that is not very interpretable (maybe it’s due to chance, or it reflects a cognitive process secondary to *vegetables* concept processing). In the table below, report (1) a coordinate found somewhere around the center of that cluster; (2) the total no. voxels of that cluster; and (3) the AAL brain region with the most voxels in that cluster. Then, answer the question below the table. You can load two images in xjview at the same time.

x	y	z	Total no. voxels in cluster	AAL brain region with the most voxels

**Why does this cluster strike you as not very interpretable or suspicious?**

<Your answer here...>

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**1b)** This time, locate an activation cluster in the single-subject contrast that is *NOT* in the group contrast, and that potentially reflects *vegetables* concept processing. In the table below, report (1) a coordinate found somewhere around the center of that cluster; (2) the total no. voxels of that cluster; and (3) the AAL brain region with the most voxels in that cluster. Then, answer the question below the table.

<i>x</i>	<i>y</i>	<i>z</i>	Total no. voxels in cluster	AAL brain region with the most voxels

**Why do you think that this is an interpretable cluster?**

<Your answer here...>

**1c)** Lastly, answer the question below.

**Generally speaking, when should one expect a result that is due to chance or that is not easily interpretable: during single subject-analysis, or group-level analysis? Why?**

<Your answer here...>

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**2) Setting thresholds (free parameters) when viewing results [6 pts. for (a); 3 pts. for (b)]**

Again, load the group-level *vegetables* contrast into xjview (you already generated this in Question 1). Set the initial parameters to those shown in slide 35.

**2a)** Change the cluster size threshold from 10 voxels to 100. Observe what happens. Now answer the questions below.

**What has changed when increasing the cluster size threshold?**

<Your answer here...>

**Generally speaking, when would a high cluster size threshold not be a good idea?**

<Your answer here...>

**2b)** Reset the cluster size threshold to 10 (from 100). Then, change the pValue threshold from 0.005 to 0.001. Observe what happens. Now answer the question below.

**What happens to the activation clusters as the pValue threshold decreases? Why does this happen?**

<Your answer here...>

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### 3) Interpreting group-level results [6 pts.]

In the *animals* group-level contrast that you did as a practice exercise, there were only a few small scattered activation clusters. What might this mean about different people's ways of thinking about animals?

<Your answer here...>

How could you modify our experiment to increase the chances of finding more common activation between the subjects? (Experiment described in: A Neurosemantic Theory of Concrete Noun Representation Based on the Underlying Brain Codes; Just et al., 2010.) Also, would more common activation necessarily be a good thing? Why?

<Your answer here...>

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