

Name: _____

Total: / 20

Session 10 assignment

Due by: 04/13/16 start of lab, printed OR e-mail (to: bauera@cmu.edu)

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

Purpose: To explore how voxel-wise modeling is used to predict brain activation patterns, where in cognitive science this approach could be successfully applied, and the societal impact of mind/brain-reading

1) Classification accuracy isn’t necessarily everything [4 pts.] Report the displayed proportion correct (i.e. classification accuracy) after running the “do_VM_accuracy” script, which you do *not* need to edit beforehand for this question. (Note that the within-subject MVPA accuracy, which is from a *discriminative* classifier, is also given below.)

Within-subject MVPA accuracy (%)	VM classification accuracy (%)
84.13	

Give a possible reason below for the VM classification accuracy being less than the within-subject MVPA accuracy. Is VM’s lower accuracy unexpected and undesirable? Why?

<Your answer here...>

2) Where there’s agreement [8 pts.] Choose *two* of the below object concepts whose predicted activation patterns you will compare to the actual, observed activation patterns. (You will run the “do_VM_activations” script each time.) Then, for each chosen object in the answer box below, list the AAL brain area(s) of one or two clusters where the predicted and observed activation patterns match (in terms of *approximate* cluster size and anatomical location). For these areas, does the agreement make sense, given what you know about your chosen objects? [For help, see the semantic factors in this paper: A Neurosemantic Theory of Concrete Noun Representation Based on the Underlying Brain Codes; Just et al., 2010. If the locations of a semantic factor in this paper are only left-lateralized, this doesn’t necessarily imply that similar/homologous right-lateralized clusters in your observed or predicted data aren’t meaningful.]

Possible objects: [train, chisel, barn, cat]

Name: _____

First state the chosen object, then answer the question: _____

<Your answer here...>

First state the chosen object, then answer the question: _____

<Your answer here...>

3) Using voxel-wise modeling elsewhere in cognitive science [4 pts.] Think of a topic in cognitive science that interests you, where you might try to use voxel-wise modeling to predict the activation patterns of concepts or other stimuli in that area. What would the features be that define the stimuli? How would one obtain a feature decomposition of a stimulus? How feasible would this research be?

<Your answer here...>

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4) Broader implications [4 pts.] Explain how the prediction of fMRI activation patterns by governments or the private sector could be helpful or harmful (e.g. on the education system, etc.).

<Your answer here...>

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