**MATLAB**

* Add to the path (with subfolders): SPM12, plmvpaLite-master-Classifier-RSA\_Script (both in ‘documents’ -office desktop) , MVPA\_HELPERCODE folder (in OLNOLTimecoruses folder: D:\POSTDOC\_GT\Research Collab Projects\Time courses of Qiliangs prior study\MVPA\_Script\_with\_Pathplot\OLNOLTimecourses).
* Working directory (path): D:\POSTDOC\_GT\Research Collab Projects\Time courses of Qiliangs prior study\MVPA\_Script\_with\_Pathplot
* plMVPALite\_master folder contains the MVPA classifier and the RSA.
* All the analysis I run are stored in mvpa\_output\_files. E.g., 8080test\_2way\_nf\_train\_OLNewROI4vsOLNewROI6\_test\_OLNewROI4vsOLNewROI6\_Featset01
* The higher the percentage the higher the difference (above chance 50%).

For the **timecourses (TC) analysis** I’ll deal with 3 scripts:

1. The **TIB\_run\_mvpa\_general** (I’ll only need to edit 1 line. Maybe for the path).

\*Note if I need to change the name of the output file > line 46 of the general script.

1. **Generate\_conditionlabels\_forpatterns** file: Right before I run the analysis, I have to edit this file (Binary classification example: lines 30-35).

\*Note if I train the classifier on one set but want to test it on a different set I’ll have to edit the ‘binary’ chunck (lines 77-88). For instance, in the RSC vs RSComplex. This will help figure if the discrimination generalizes. Same pattern = no difference.

1. **Mvpa\_params\_general\_OLNOL\_Timecourses**:

Line 10- contains the call that is given to mvpa\_genenral to run: TIB\_run\_mvpa\_general({'01'},'OLNOLTimecourses',{[480]},'8080test')

Line 36: subject ID > ‘features’ in our case.

Line 46: betacount: 480. Note for early-late double the number: 960

I can double check it by looking at the wokspace>testmat

Line 51: TR – we should keep it as 1 despite it is TR 2 because our onsets file, in this case, is a numerical list of betas instead of onsets.

Line 83: CLASSIFER TRAINING. E.g., 'OLNewROI4vsOLNewROI6'

Line 92: CLASSIFER TESTING. E.g., 'OLNewROI4vsOLNewROI6'.

Line 101: cross-validation: loo or **nf**.

Line 102: 480 (change to 960 for early-late).

Line 137: edit path. E.g., 'D:\POSTDOC\_GT\Research Collab Projects\Time courses of Qiliangs prior study\MVPA\_Script\_with\_Pathplot\'

Line 161: Balancing parameters > turn it on.

Line 234: Regularization (**L1**)

Line 242: Penalty for relying on noisy features: 100 (it was 60 at first but we you have to try with different data sets.

Line 361 > EDIT - Information about Conditions/Classes specific to the training and testing of specific subsets of data: I have to add all the conditions I’ll run for both TRAINING AND TESTING. I’ll have to copy and paste this as many times as contrasts I run. E.g.,

%TRAINING

if strcmp(S.trainTask,'OLNewROI1vsNOLNewROI1')

S.onsetsTrainDir = [S.mvpa\_dir];%directory containing onsets.mat or betas\_idx.mat file to be loaded in

S.condsTrain = {{'ol\_new\_roi1'} {'nol\_new\_roi1'}} ;%corresponds to the names in the onsets.mat or betas\_idx.mat files. This is used to select what is being compared with what.

S.TrainRuns = par.scansSelect.(par.task).loc;%pull up indexing, defined above, for RUNS corresponding to task of interest (i.e. if runs 2,4,6 correspond to task 1)

if strcmp(S.inputformat, 'raw')

S.filenames\_train = raw\_filenames;%

elseif strcmp(S.inputformat, 'betas')

S.filenames\_train = beta\_filenames;%

end

S.durTrain = numel(S.filenames\_train) \* par.TR;

%TESTING

if strcmp(S.testTask,'OLNewROI1vsNOLNewROI1')

S.onsetsTestDir =[S.mvpa\_dir];%directory containing onsets.mat or betas\_idx.mat file to be loaded in

S.condsTest = {{'ol\_new\_roi1'} {'nol\_new\_roi1'}};

S.nwayclass = num2str(numel(S.condsTest));%stores the number classification dimensions just for reference (i.e. is this a 5-way or a 2-way/binary classification?)

S.TestRuns = par.scansSelect.(par.task).loc;

if strcmp(S.inputformat, 'raw')

S.filenames\_test = raw\_filenames;%

elseif strcmp(S.inputformat, 'betas')

S.filenames\_test = beta\_filenames;%

end

S.durTest = numel(S.filenames\_test) \* par.TR;

%[~, idxTe] = fMRIBehAnalysis\_Loc(par);

When training in one data set but testing in a different one (e.g., RSC vs RSComplex):

Eg.,

Training:

**OL**NewROI1vs**NOL**NewROI1

Testing:

**OL**NewROI2vs**NOL**NewROI2

> Change the ‘generate condition labels for patterns file’ : lines 84-95

>Edit the params file sections

**List of ROIs**:

ROI1: RSComplex

ROI2: RSC (ba2930)

ROI3: Hippocampus

ROI4: NAcc

ROI5: Caudate

ROI6: Putamen

Analysis to run:

1)Here we are comparing if any brain region can distinguish between Overlapping (new) and learning a new maze.

Simple New - OL vs New – NOL (NEW DATA: balancing and penalty 100 – a bit weaker-)

OLNewROI1vsNOLNewROI1 – 0.50575%

OLNewROI2vsNOLNewROI2- 0.547%

OLNewROI3vsNOLNewROI3- 0.428%

OLNewROI4vsNOLNewROI4- 0.60175% NAcc

OLNewROI5vsNOLNewROI5- 0.1105% Caudate

OLNewROI6vsNOLNewROI6 – 0.3885%

Simple New - OL vs New – NOL (OLD DATA: not balancing and penalty 60)

OLNewROI1vsNOLNewROI1 – 0.46%

OLNewROI2vsNOLNewROI2- 0.525%

OLNewROI3vsNOLNewROI3- 0.4%

OLNewROI4vsNOLNewROI4- 0.6% NAcc

OLNewROI5vsNOLNewROI5- 0% Caudate

OLNewROI6vsNOLNewROI6 – 0.35%

2) Hippo -Striatum (e.g., hippo ol vs nacc ol)

Here we are comparing the hippocampus vs all striatal regions in OL mazes and in NOL mazes. GRADIENT RESULT

**OL**:

OLNewROI3vsOLNewROI4 - 0.66225 we’ll have to look at the plots\*

OLNewROI3vsOLNewROI5 - 0.71625

OLNewROI3vsOLNewROI6 - 0.79575

**NOL**:

NOLNewROI3vsNOLNewROI4 - 0.668

NOLNewROI3vsNOLNewROI5 – 1 run 0.69925/ 2 run 0.698

NOLNewROI3vsNOLNewROI6 - 0.641

1. 3 way striatum (NAcc, Caudate, Pu) – note chance is 33% now.

**\*adjust the code in the params script, we don’t have to change the name of the output**

**OL**:

OLNewROI4vsOLNewROI5vsOLNewROI6 - 0.47

**NOL**:

NOLNewROI4vsNOLNewROI5vsNOLNewROI6 - 0.44067

Look at the confusion matrix:

1. Differences between RSC and RSComplex (Train on roi1> Test on roi2)
2. **OL**: comparing ROI1 vs ROI2 performance in **OL** mazes (and NOL)

S.trainTask = ' OLNewROI1vsOLNewROI2 - 0.60575

S.testTask = ' OLNewROI1vsOLNewROI2

**NOL**: comparing ROI1 vs ROI2 performance in **NOL** mazes

S.trainTask = ' NOLNewROI1vsNOLNewROI2 - 0.4075

S.testTask = ' NOLNewROI1vsNOLNewROI2

**b)** comparing if there is any difference in the pattern when doing **OL vs NOL in RSComplex compared to RSC.**

\*This requires adjusting some parameters in the generate\_conditionlabels script (see above).

Training:OLNewROI1vsNOLNewROI1

Testing: OLNewROI2vsNOLNewROI2 - 0.675 – this shows that the way they treat this 2 situations is significantly the same, but when we look above (within roi comparisons) the results fall to chance almost, so they don’t discriminate OL vs NOL.

1. **Differences between Str areas**

**NAcc vs Caudate OL**

1. OLNewROI4vsOLNewROI5 - 0.53525

Confusion matrix: Way biased towards the caudate

1. **NOL**

NOLNewROI4vsNOLNewROI5 **- 0.46525**

Confusion matrix: It favors the Caudate (0.67) ovr the NAcc (0.25)

**NAcc vs Putamen OL**

1. OLNewROI4vsOLNewROI6 – 0.672

B) **NOL**

NOLNewROI4vsNOLNewROI6 – 0.6745

**Caudate vs Putamen OL**

1. OLNewROI5vsOLNewROI6- 0.658
2. **NOL**

NOLNewROI5vsNOLNewROI6 - 0.61225

**NEXT STEPS:**

1)Weirdos? behavioral logs are we missing any runs?

2) Early/late only in significant data (eg. Str OV gradient), also hippocampus (OL and NOL?) within early ad within late comparisons.

3) Data scramble analysis? Get p values

4) Get the TC plots with the average durations for each even/hallway)

CHECK THIS:

\*We cannot run the early-late analysis for S07,15,20 as they have missing files.

~~\*\*Also, check S04, 06, 07, 08, 16.~~

All these are missing the specification model file:

S07 is missing run 01, so model early-late should run run02 to 10

S15 is missing the last 2 runs: we have to run run1 to run8

S20

\*we’ve gto the model specification for for s07 and s15, I need to do the first level analysis (use model file made on data2 bold brown lab).