Projection neuron optical physiology analysis

12-18-2018

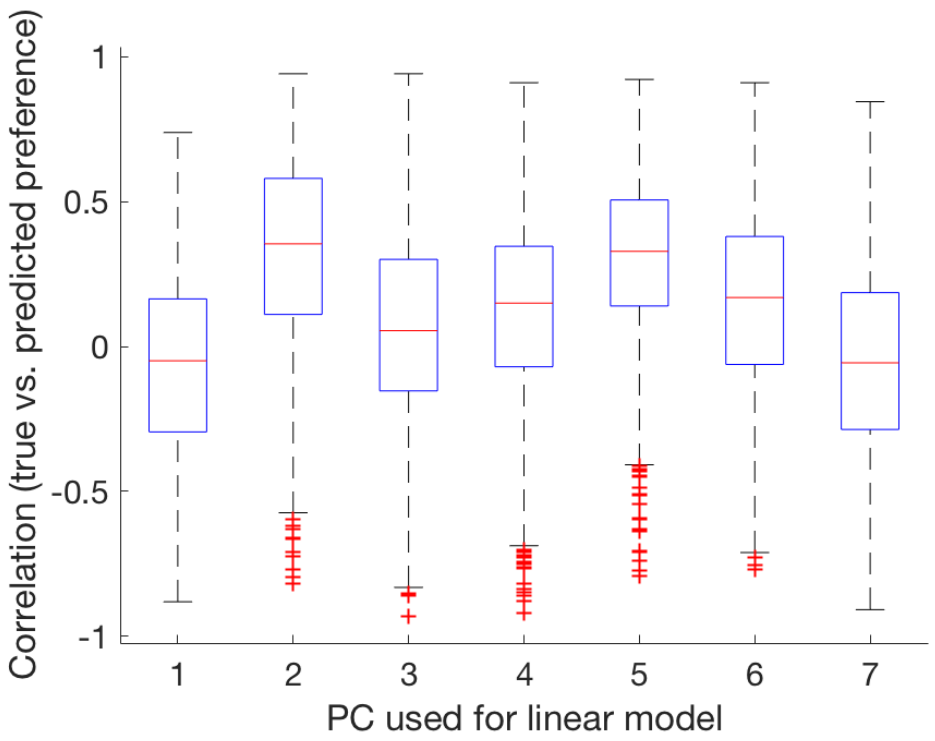
MAC

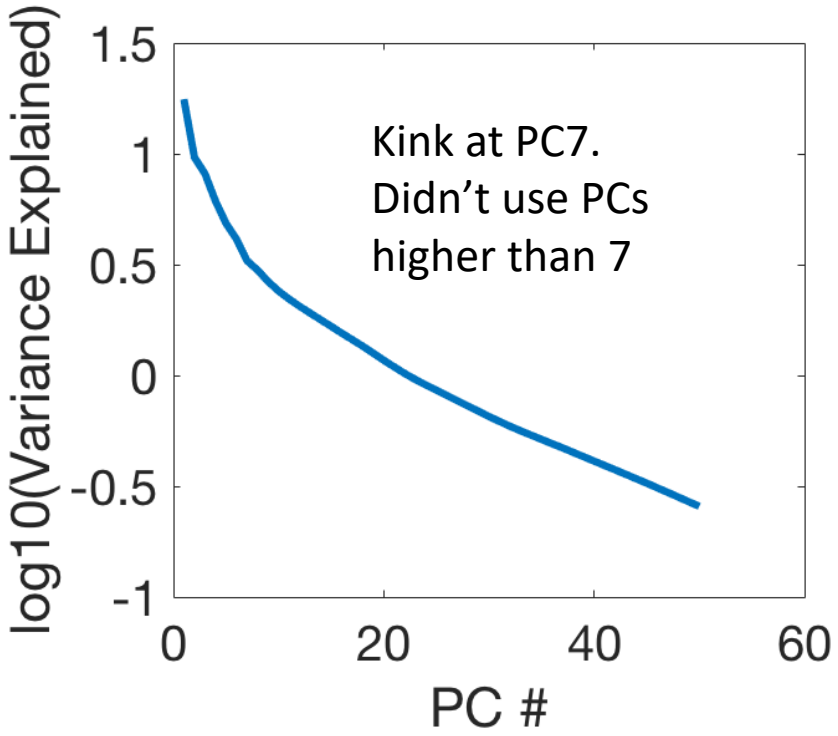
Predicting MCH vs. OCT behavior preference from GH146—gcamp6m activity

Cross-validation with 1000 iterations of random 80/20 train/test split

N=47 flies

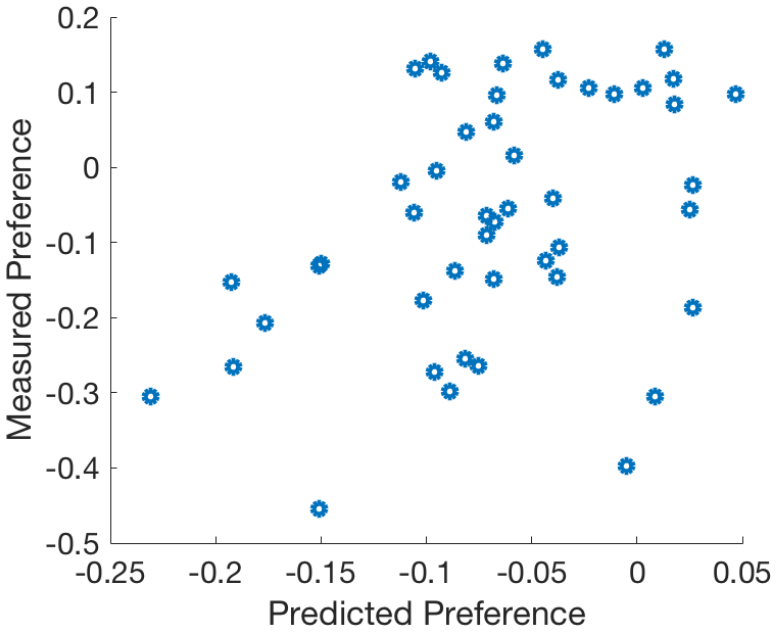
PC2 and PC5 are consistent predictors of behavior



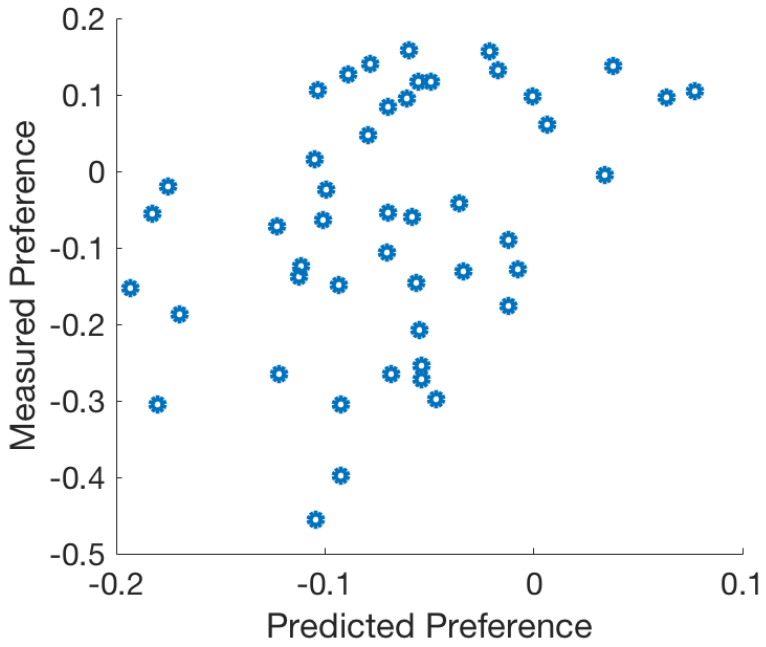


Training data

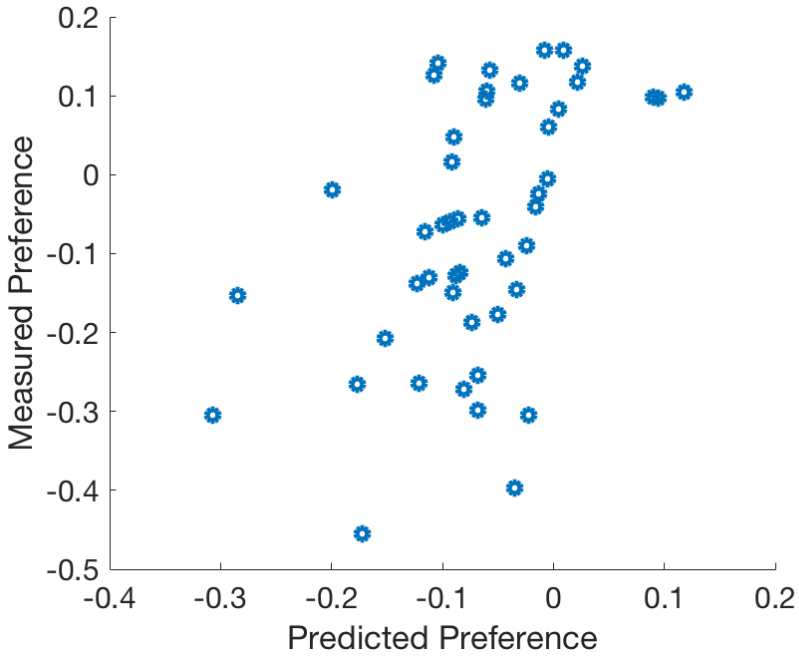
PC 2 prediction



PC 5 prediction

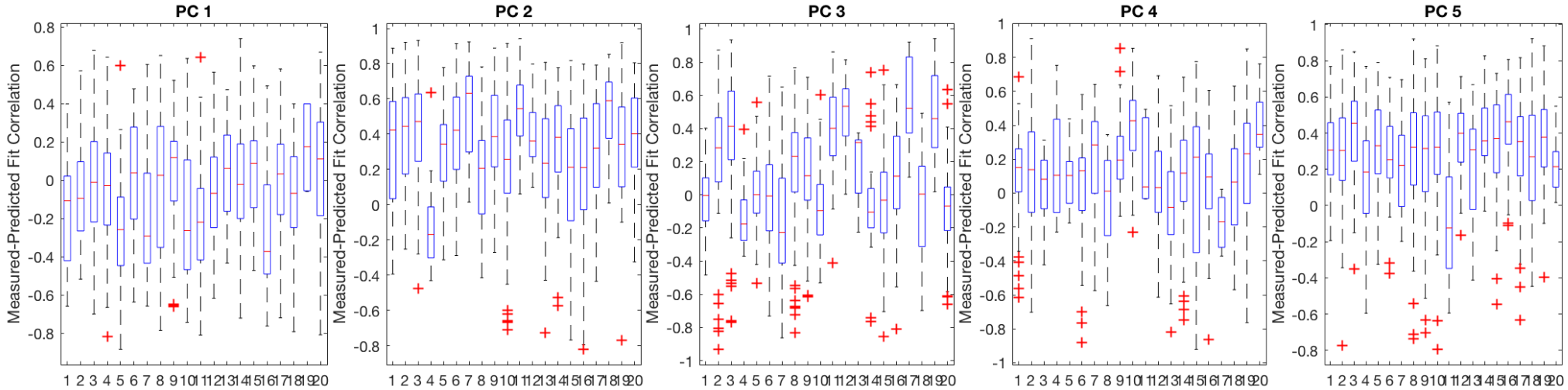


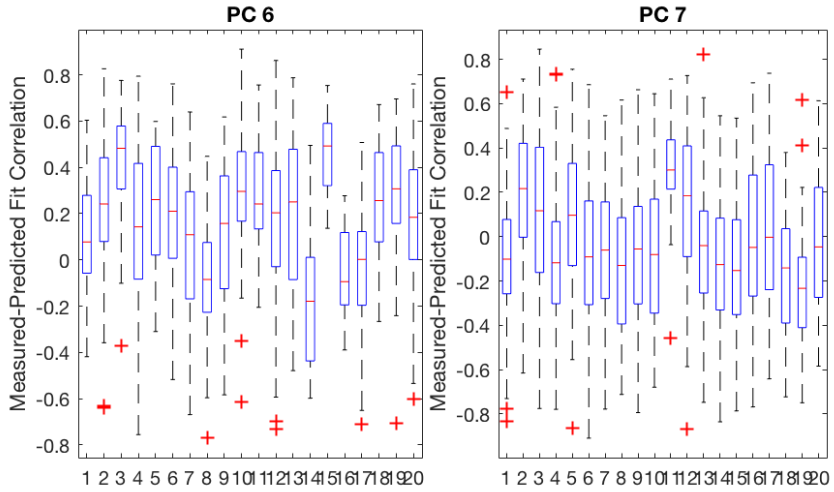
PC 2 and 5 prediction



N = 47 flies

Addressing PC shuffling during cross-validation

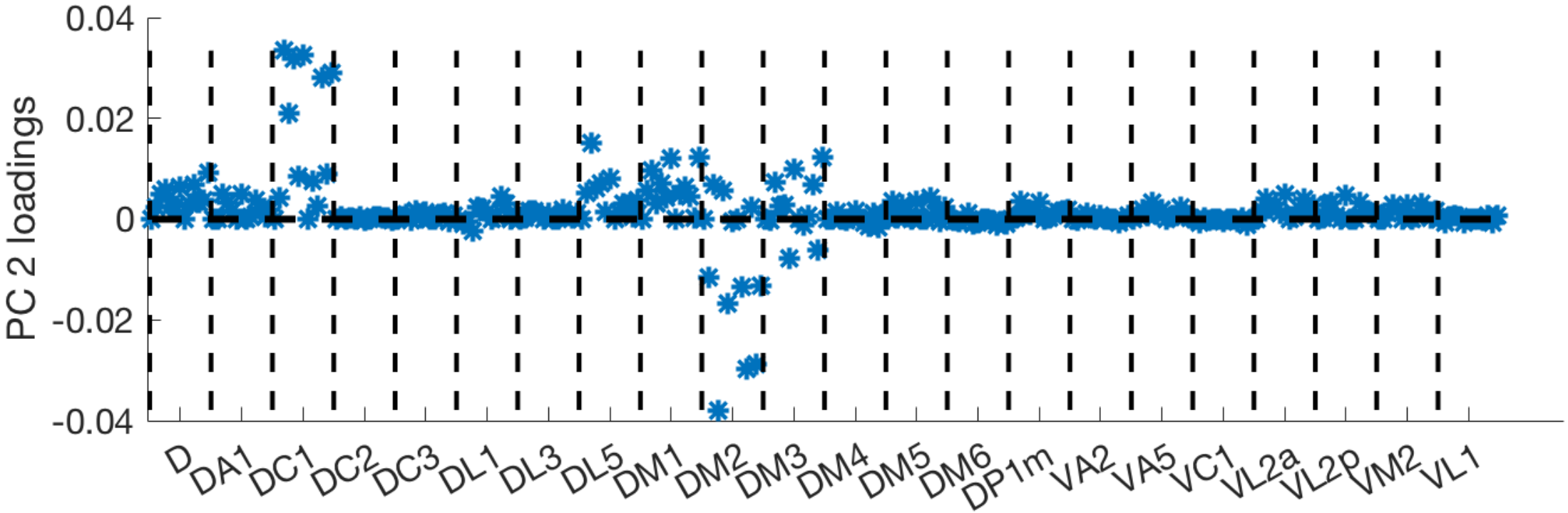




1) Save each PC during each cross-validation iteration (1000 iterations)
2) Perform k-means (k=20) on each saved PC matrix to identify the common motifs within each PC

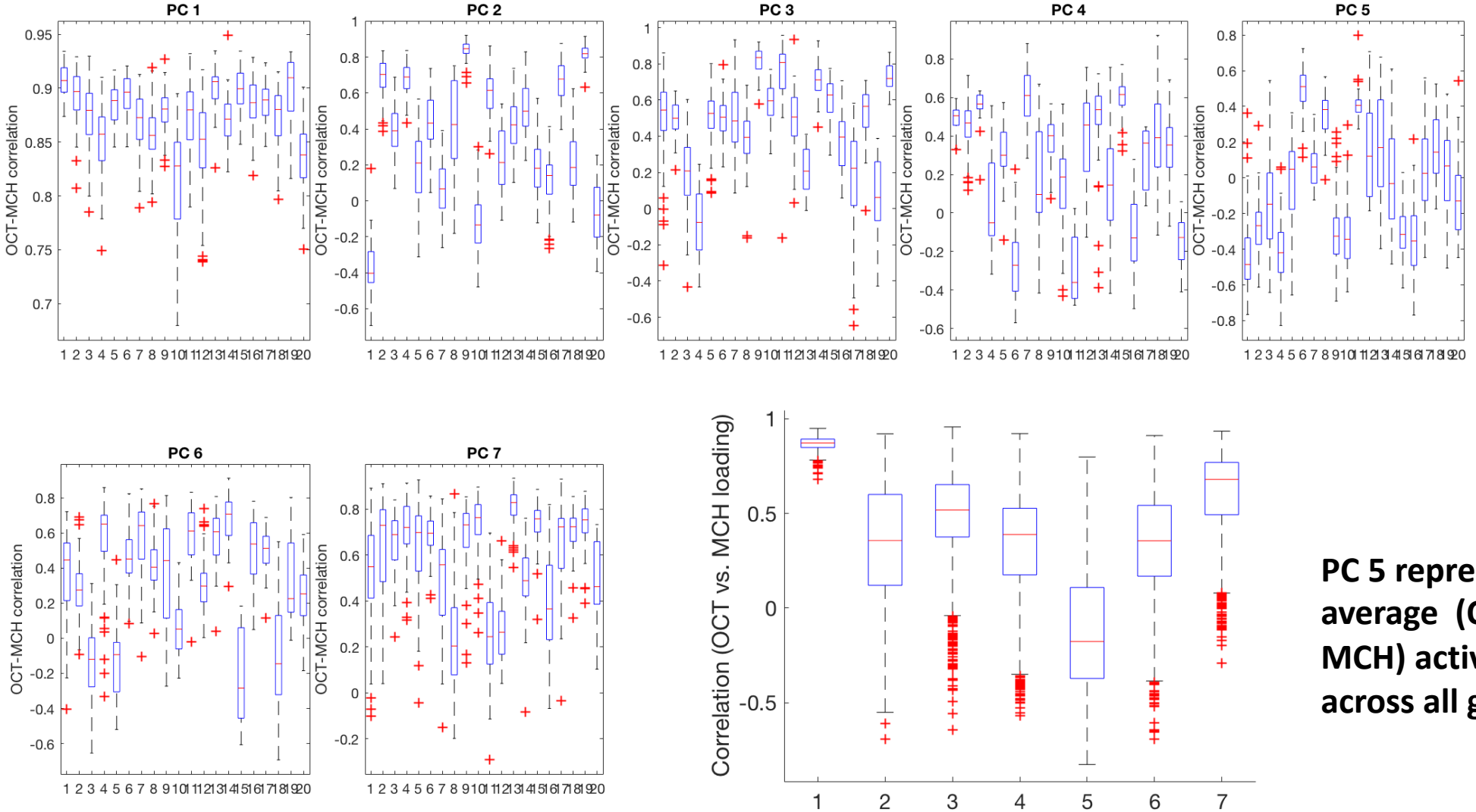
Plotted here: Measured-Predicted behavior correlation for each PC and each k-means-identified clusters within each PC

What does PC 2 represent?



Basically represents average DC1 – DM2 response

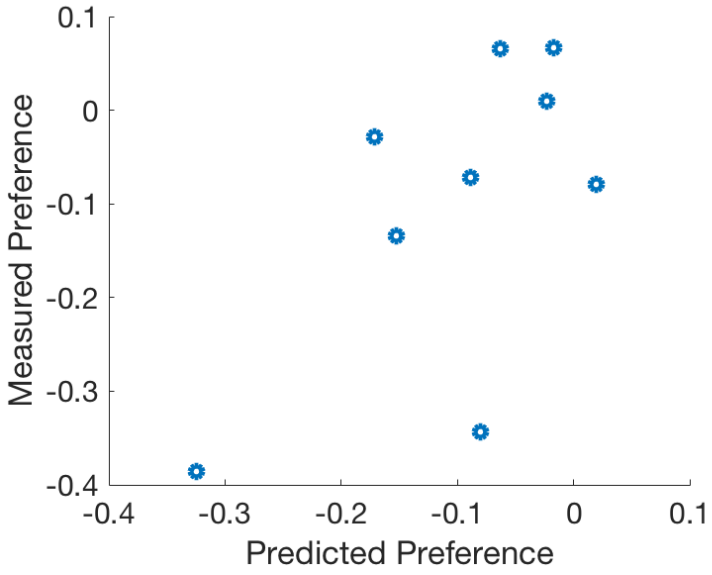
What do does PC 5 represent?



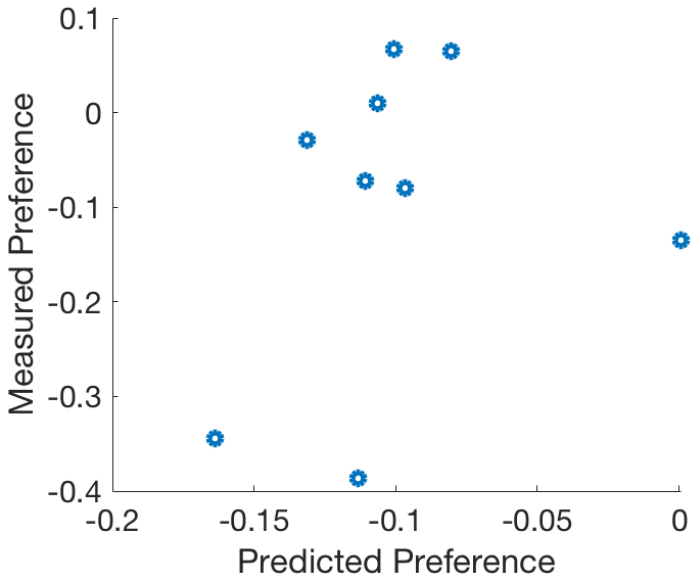
PC 5 represents average (OCT minus MCH) activation across all glomeruli

Predictions on held out data

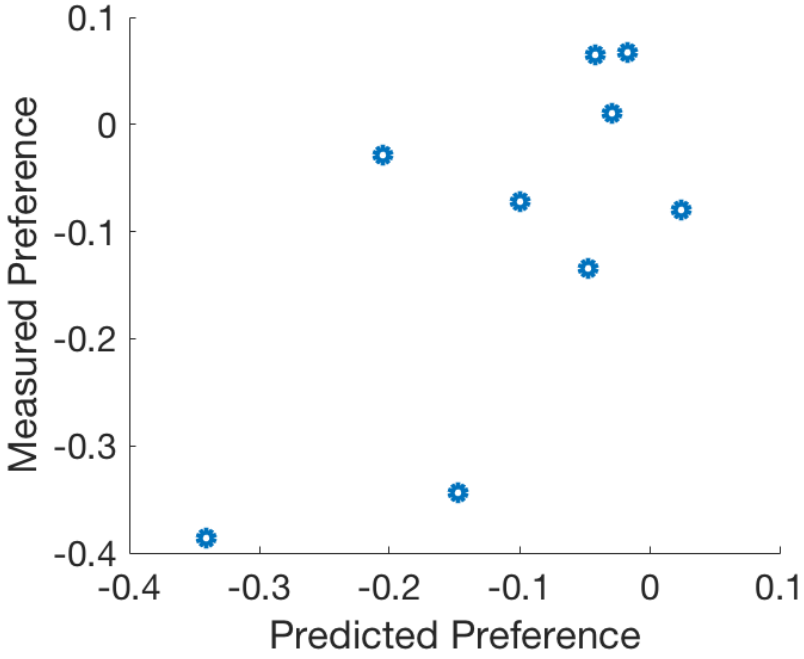
PC 2 prediction



PC 5 prediction



PC 2 and 5 prediction



N = 9 flies

Prediction on held out data using 1) relative DC1/DM2 activation and 2) relative OCT/MCH activation

2 hypotheses generated from PC cross-validation analysis.
Directly compute

1) Average DC1 - DM2 activation (hypothesis came from PC2)
2) Average OCT - MCH activation (hypothesis came from PC5)
3) Use these quantities for behavior prediction (right)