

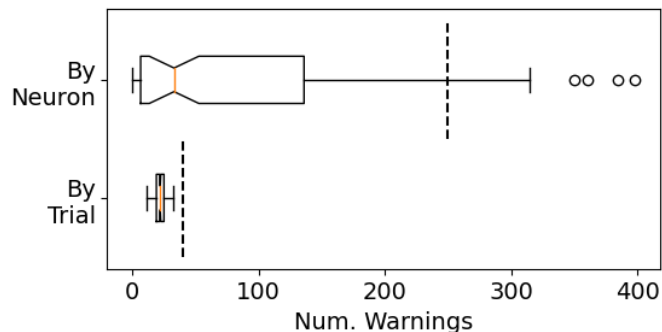
Figures generated by 'decoding_individual_identity.ipynb'

source:

<https://github.com/timtyree/tbins.git>

Session #46

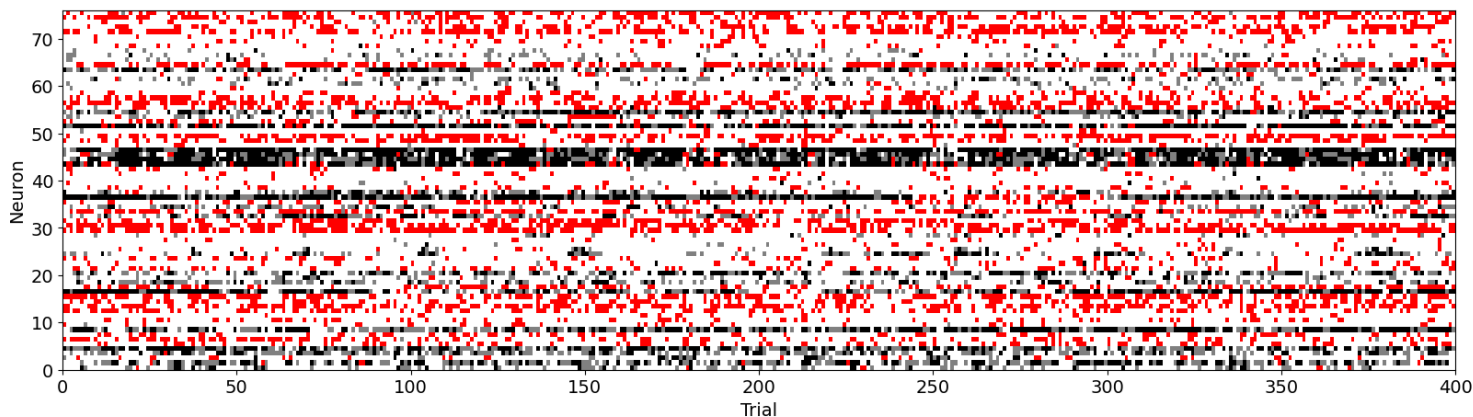
Whole session plotted



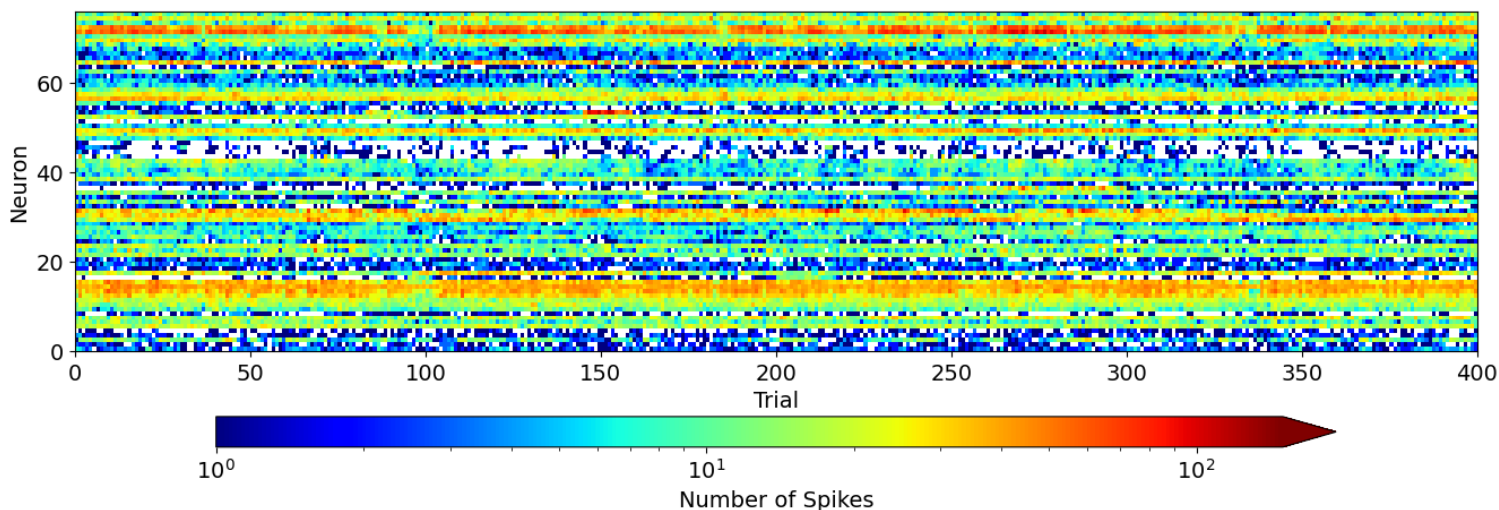
Simple method of removing trials with obvious recording errors. Having >250 trials with (red) warnings lead to the removal of a neuron.

No Error No Spikes One Spike Exceeds Max FR

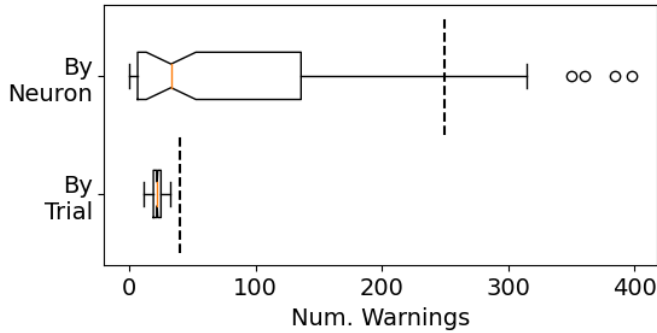
Warning For All Trials



Spike Counts For All Trials



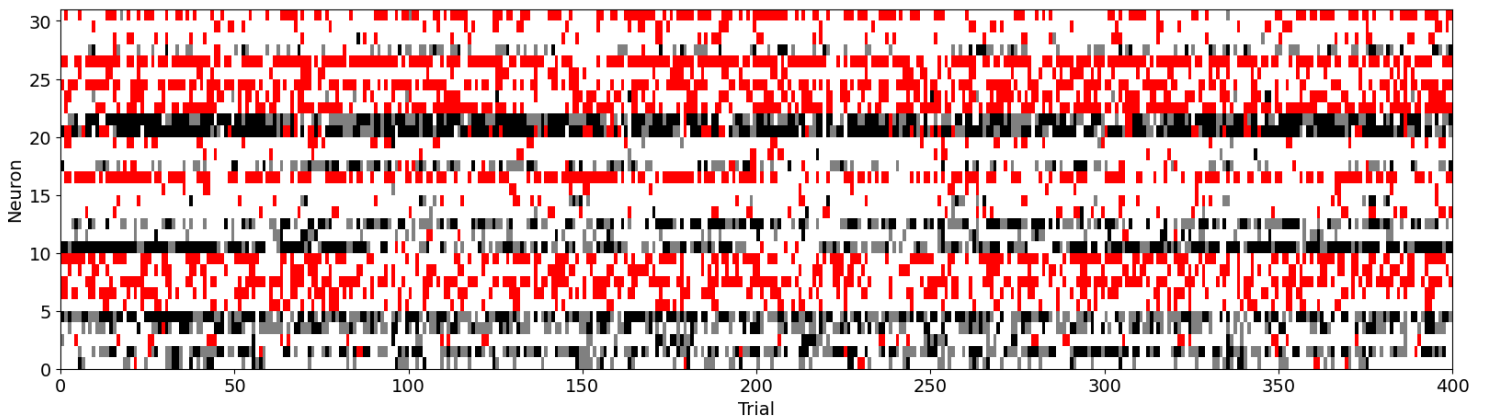
Apparent Predictive Neurons (#46)



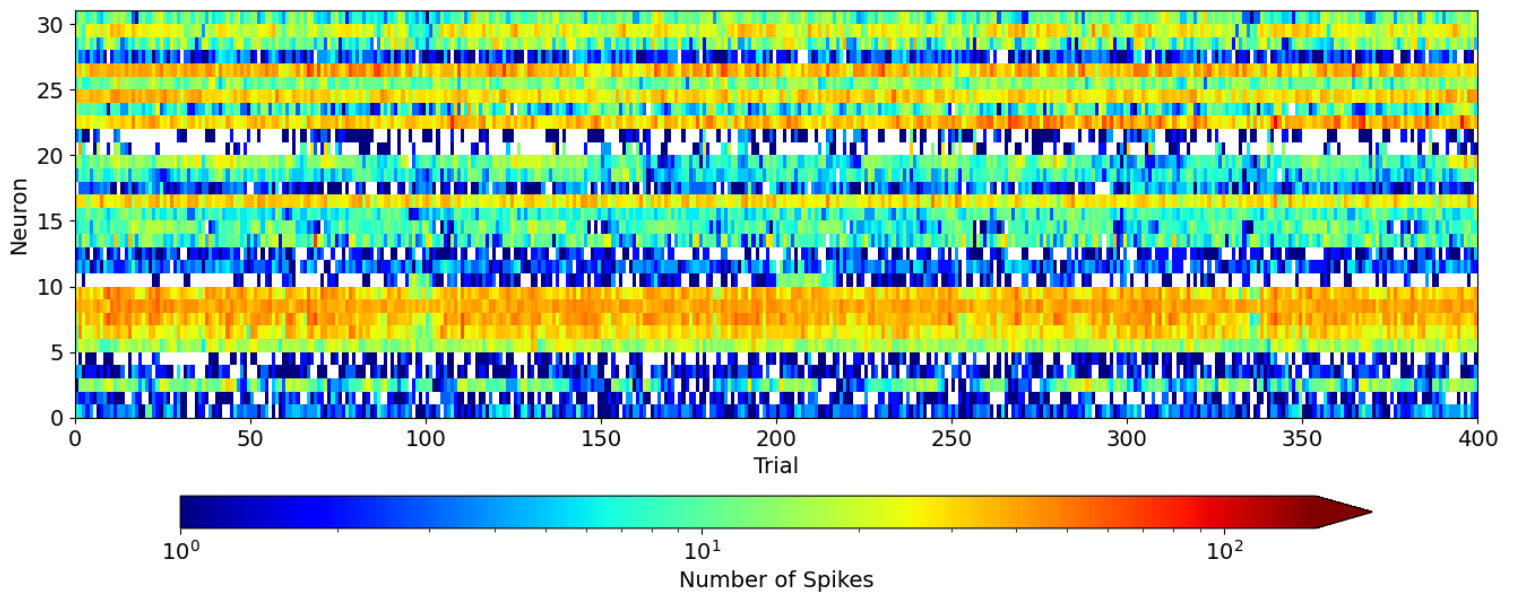
Simple method of removing trials with obvious recording errors. Having >250 trials with (red) warnings lead to the removal of a neuron.

No Error No Spikes One Spike Exceeds Max FR

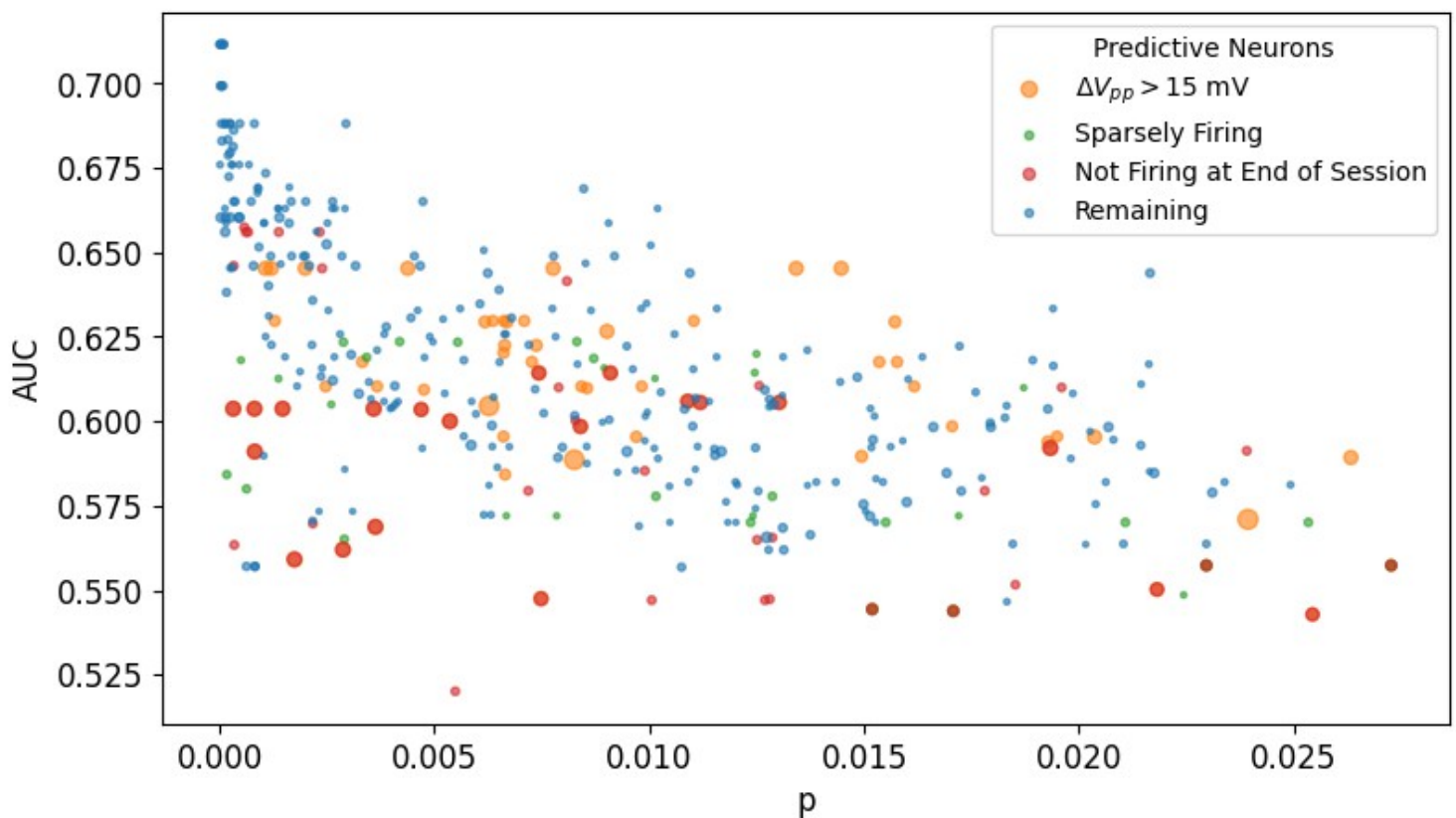
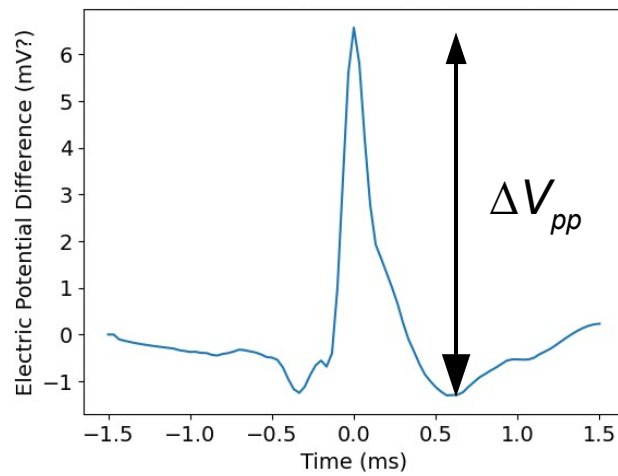
Warnings For Predictive Neurons



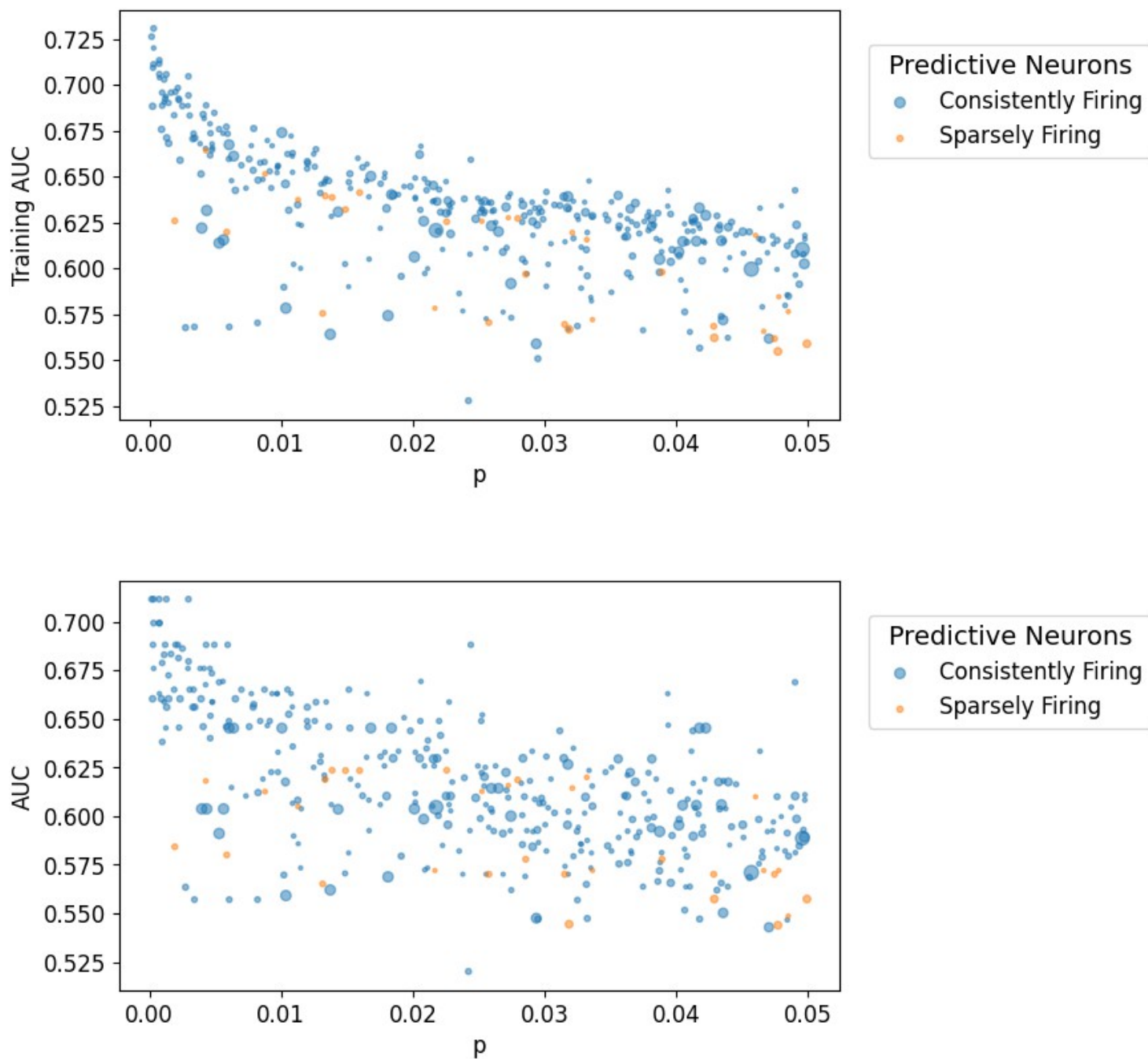
Spike Counts For Predictive Neurons



Larger spike amplitudes suggest worse prediction from an apparent predictive time bins (#46)

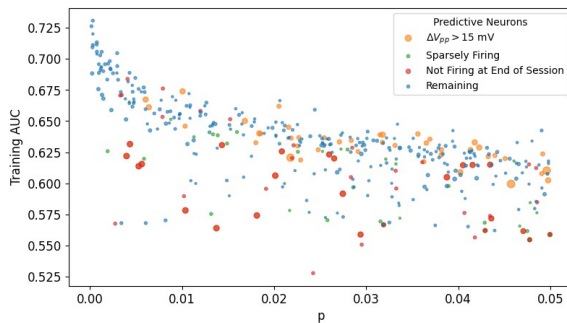


Sparsely firing neurons can be an artifact of a neuron being oversplit during spike sorting (#46).

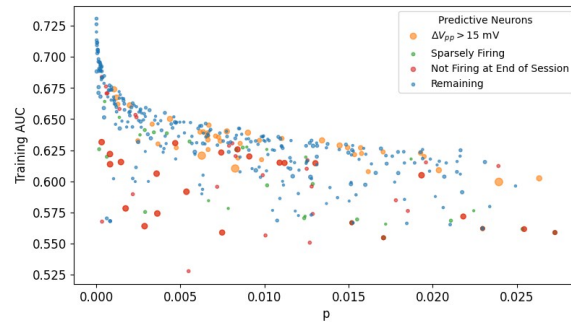


Hades observing the face or voice of her sister, Hermes (#46).

Mean
training p value

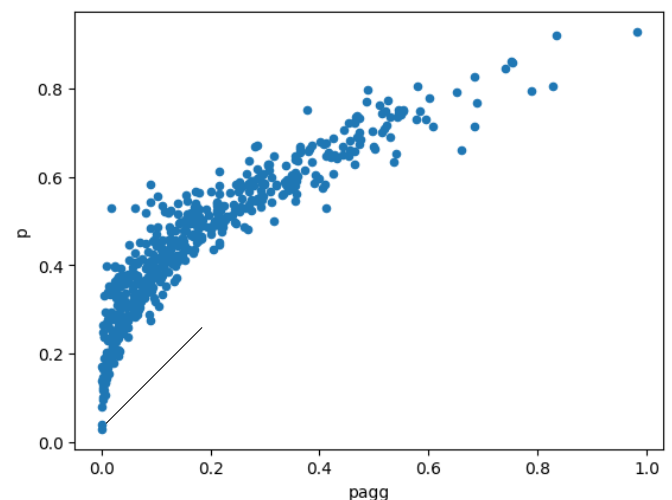
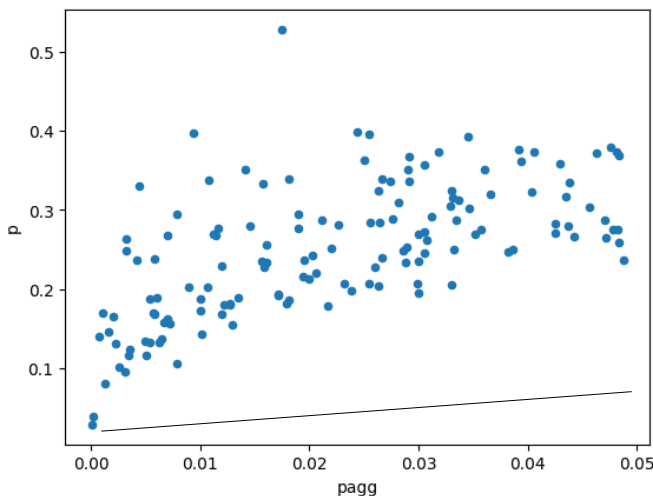


Classic
training p value

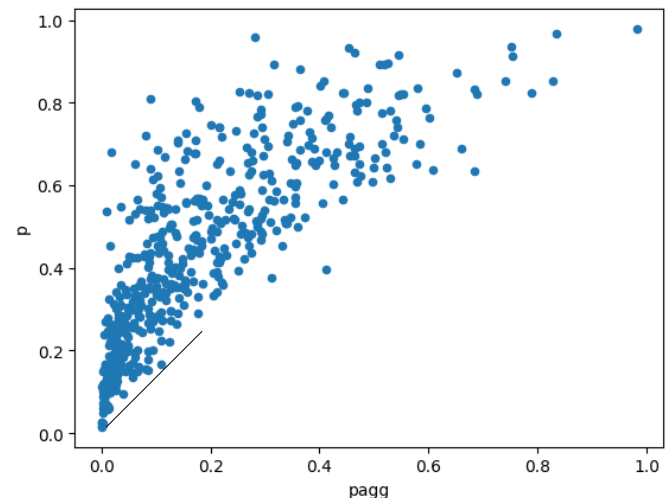
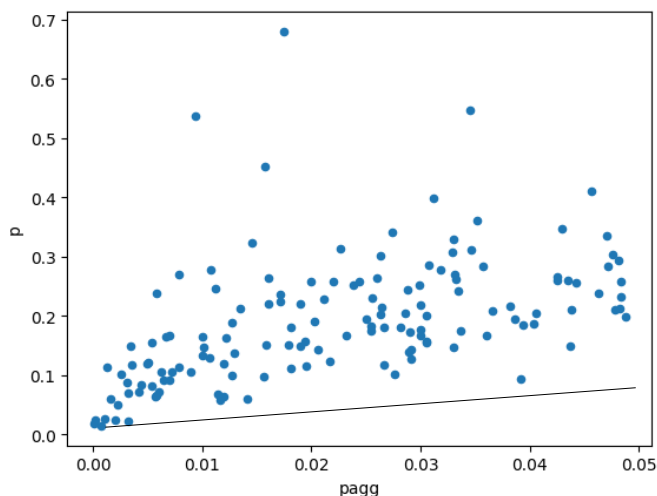


Demonstration that the (y-axis) mean p -statistic is sufficient relative to (x-axis) Wilcoxon-Mann-Whitney test conducted over all of the training trials

Training p (pagg) versus mean training p (Session #8)



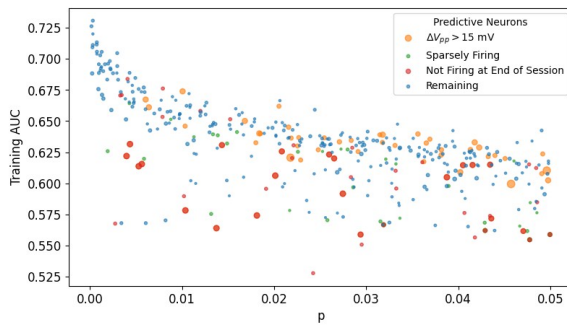
Training p (pagg) versus median training p (Session #8)



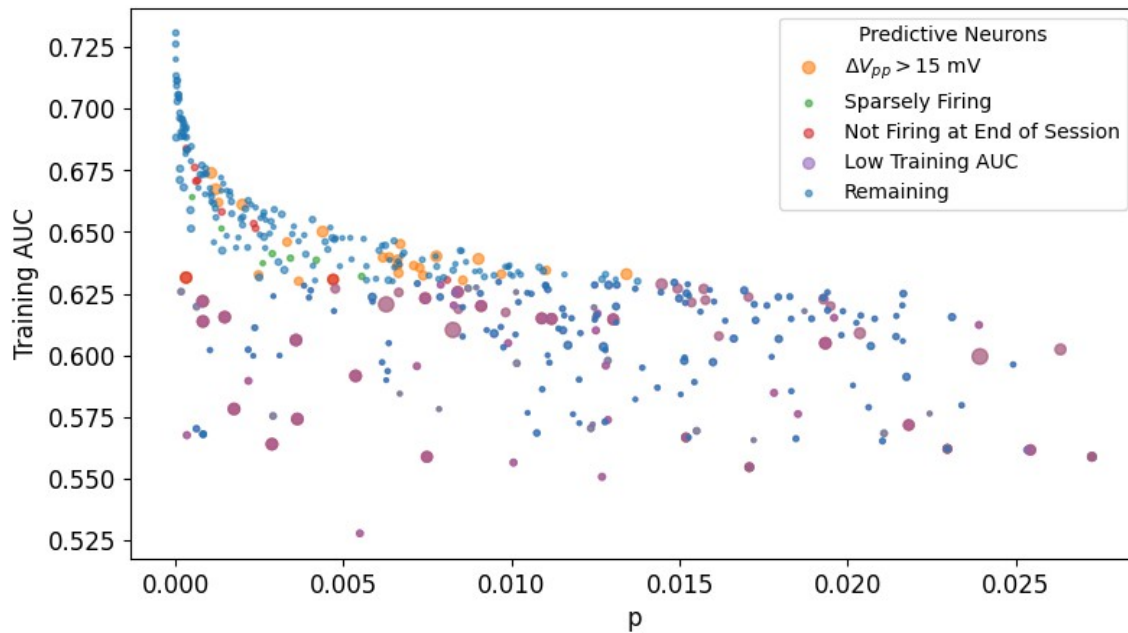
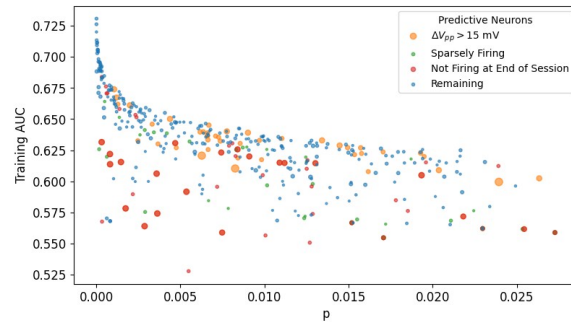
(Session #8 is available upon request)

Hades observing the face or voice of her sister, Hermes (#46).

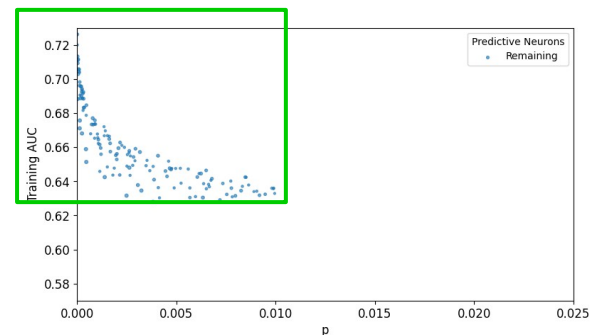
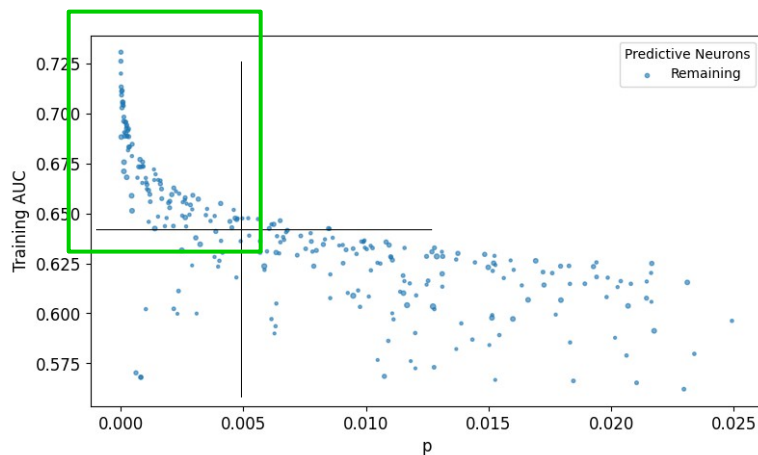
Mean
training p value



Classic
training p value

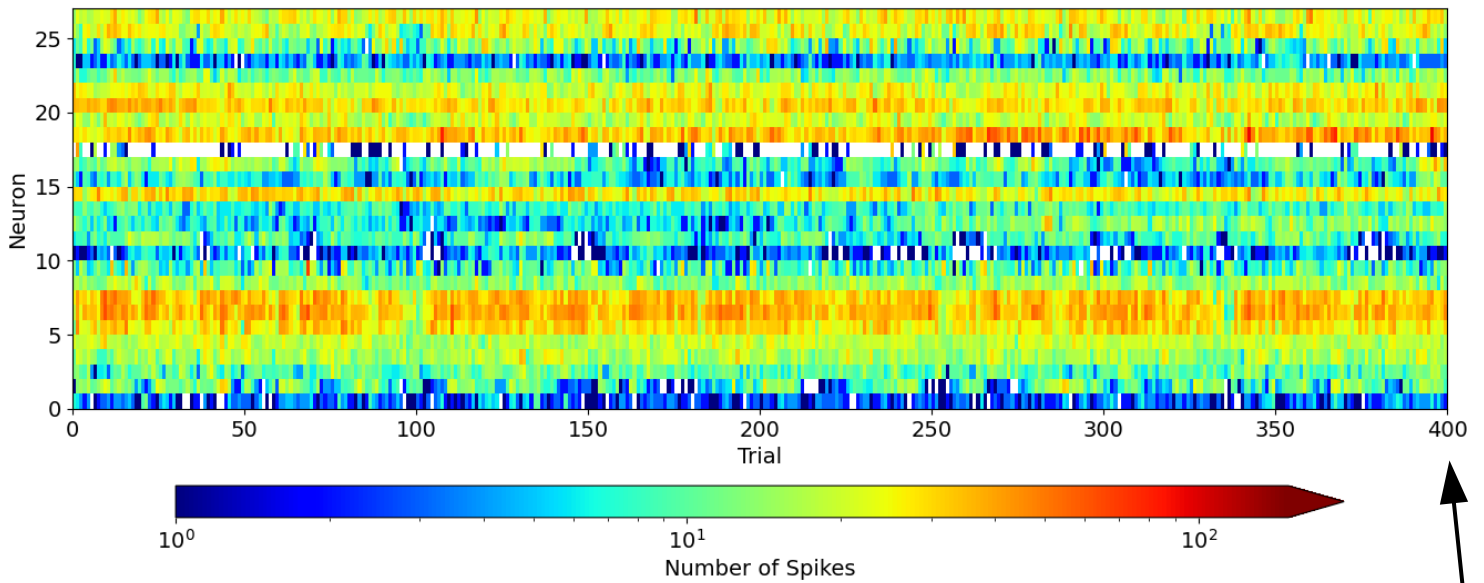


*Train and test decoders only with
these (green) predictive time bins*



Spike counts of Predictive Neurons

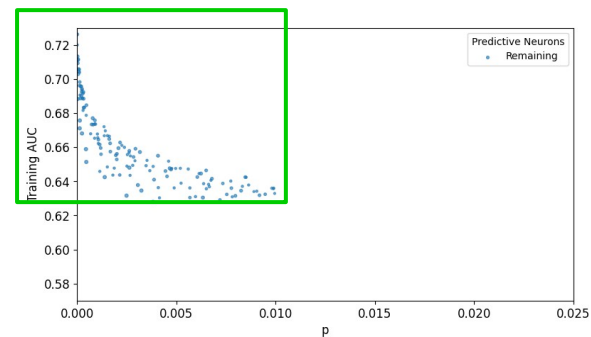
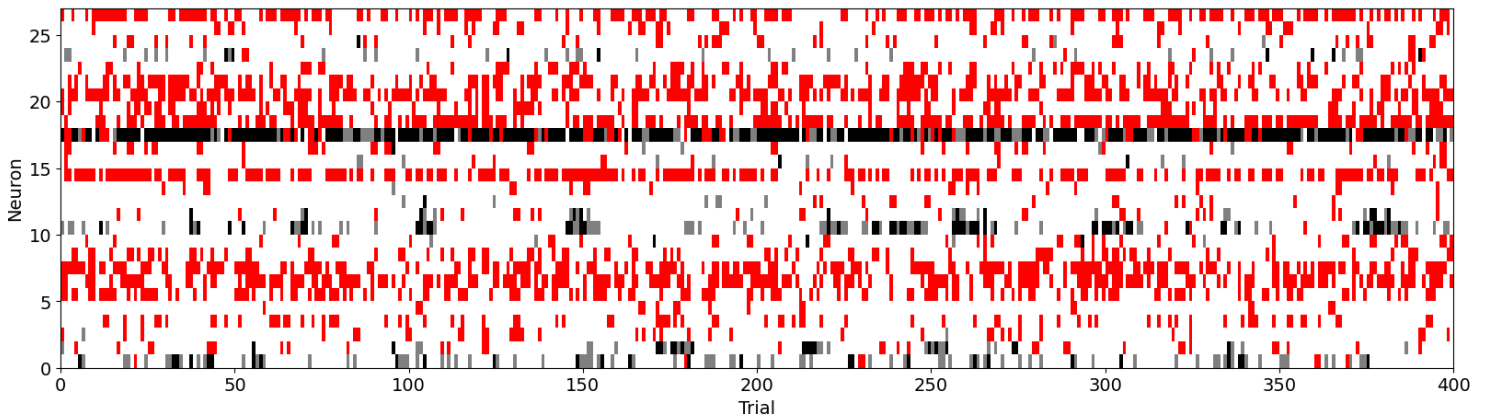
Spike Counts For Predictive Neurons



After filtering predictive time bins

No Error No Spikes One Spike FR Exceeds Max

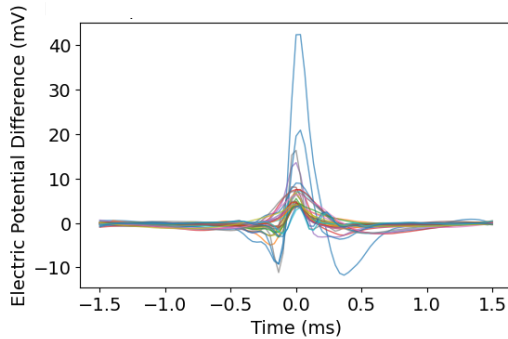
Warnings For Predictive Neurons



Spike Sorting Templates of predictive neurons before/after filtering (#46)

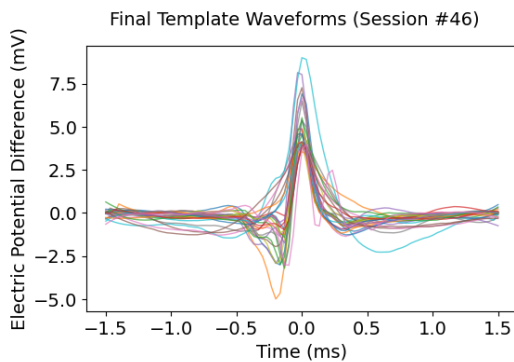
(note the change in max ΔV_{pp} .)

Before filtering predictive time bins



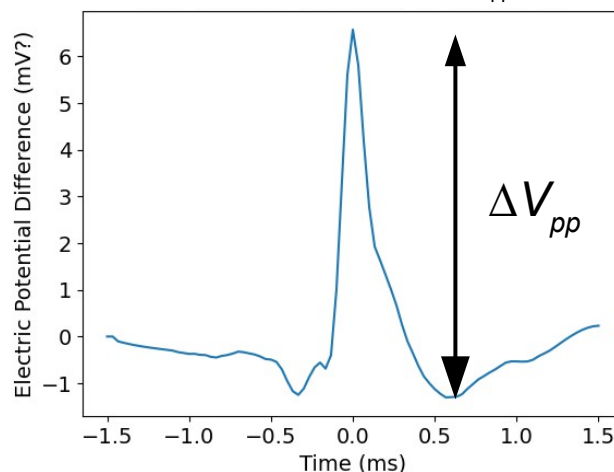
Predictive Neurons		
Neuron #0 (AUC=0.60, $\Delta V_{p,p}$ 54.2 mV)	Neuron #40 (AUC=0.65, $\Delta V_{p,p}$ 5.2 mV)	Neuron #63 (AUC=0.58, $\Delta V_{p,p}$ 4.7 mV)
Neuron #7 (AUC=0.64, $\Delta V_{p,p}$ 8.5 mV)	Neuron #46 (AUC=0.60, $\Delta V_{p,p}$ 5.6 mV)	Neuron #63 (AUC=0.59, $\Delta V_{p,p}$ 6.5 mV)
Neuron #8 (AUC=0.70, $\Delta V_{p,p}$ 8.7 mV)	Neuron #47 (AUC=0.66, $\Delta V_{p,p}$ 10.0 mV)	Neuron #69 (AUC=0.61, $\Delta V_{p,p}$ 5.6 mV)
Neuron #8 (AUC=0.69, $\Delta V_{p,p}$ 10.3 mV)	Neuron #48 (AUC=0.61, $\Delta V_{p,p}$ 6.0 mV)	Neuron #71 (AUC=0.62, $\Delta V_{p,p}$ 5.2 mV)
Neuron #24 (AUC=0.66, $\Delta V_{p,p}$ 16.8 mV)	Neuron #48 (AUC=0.60, $\Delta V_{p,p}$ 5.8 mV)	Neuron #74 (AUC=0.64, $\Delta V_{p,p}$ 4.9 mV)
Neuron #26 (AUC=0.63, $\Delta V_{p,p}$ 11.1 mV)	Neuron #50 (AUC=0.58, $\Delta V_{p,p}$ 5.2 mV)	Neuron #76 (AUC=0.62, $\Delta V_{p,p}$ 8.8 mV)
Neuron #28 (AUC=0.61, $\Delta V_{p,p}$ 8.0 mV)	Neuron #50 (AUC=0.57, $\Delta V_{p,p}$ 9.5 mV)	Neuron #77 (AUC=0.58, $\Delta V_{p,p}$ 9.4 mV)
Neuron #28 (AUC=0.60, $\Delta V_{p,p}$ 27.5 mV)	Neuron #53 (AUC=0.55, $\Delta V_{p,p}$ 9.0 mV)	Neuron #80 (AUC=0.60, $\Delta V_{p,p}$ 5.4 mV)
Neuron #30 (AUC=0.67, $\Delta V_{p,p}$ 7.7 mV)	Neuron #63 (AUC=0.61, $\Delta V_{p,p}$ 4.4 mV)	Neuron #82 (AUC=0.60, $\Delta V_{p,p}$ 6.0 mV)
Neuron #30 (AUC=0.69, $\Delta V_{p,p}$ 9.5 mV)	Neuron #63 (AUC=0.62, $\Delta V_{p,p}$ 30.2 mV)	Neuron #83 (AUC=0.61, $\Delta V_{p,p}$ 7.0 mV)
Neuron #32 (AUC=0.65, $\Delta V_{p,p}$ 11.3 mV)		

After filtering predictive time bins



Predictive Neurons		
Neuron #1 (AUC=0.59, $\Delta V_{p,p}$ 9.9 mV)	Neuron #47 (AUC=0.60, $\Delta V_{p,p}$ 11.3 mV)	Neuron #75 (AUC=0.61, $\Delta V_{p,p}$ 5.1 mV)
Neuron #7 (AUC=0.59, $\Delta V_{p,p}$ 8.5 mV)	Neuron #48 (AUC=0.60, $\Delta V_{p,p}$ 5.2 mV)	Neuron #82 (AUC=0.61, $\Delta V_{p,p}$ 4.7 mV)
Neuron #8 (AUC=0.59, $\Delta V_{p,p}$ 8.7 mV)	Neuron #51 (AUC=0.61, $\Delta V_{p,p}$ 5.4 mV)	Neuron #84 (AUC=0.61, $\Delta V_{p,p}$ 5.6 mV)
Neuron #20 (AUC=0.60, $\Delta V_{p,p}$ 4.5 mV)	Neuron #63 (AUC=0.61, $\Delta V_{p,p}$ 6.0 mV)	Neuron #85 (AUC=0.61, $\Delta V_{p,p}$ 5.2 mV)
Neuron #28 (AUC=0.60, $\Delta V_{p,p}$ 11.1 mV)	Neuron #69 (AUC=0.61, $\Delta V_{p,p}$ 5.8 mV)	Neuron #86 (AUC=0.61, $\Delta V_{p,p}$ 8.4 mV)
Neuron #29 (AUC=0.60, $\Delta V_{p,p}$ 9.2 mV)	Neuron #70 (AUC=0.61, $\Delta V_{p,p}$ 7.1 mV)	Neuron #87 (AUC=0.62, $\Delta V_{p,p}$ 4.9 mV)
Neuron #30 (AUC=0.60, $\Delta V_{p,p}$ 8.0 mV)	Neuron #71 (AUC=0.61, $\Delta V_{p,p}$ 5.2 mV)	Neuron #88 (AUC=0.62, $\Delta V_{p,p}$ 4.7 mV)
Neuron #35 (AUC=0.60, $\Delta V_{p,p}$ 5.7 mV)	Neuron #72 (AUC=0.61, $\Delta V_{p,p}$ 5.4 mV)	Neuron #104 (AUC=0.62, $\Delta V_{p,p}$ 5.4 mV)
Neuron #40 (AUC=0.60, $\Delta V_{p,p}$ 7.7 mV)	Neuron #74 (AUC=0.61, $\Delta V_{p,p}$ 9.5 mV)	Neuron #106 (AUC=0.62, $\Delta V_{p,p}$ 7.0 mV)

*Recalling the peak-to-peak
potential difference, ΔV_{pp} *

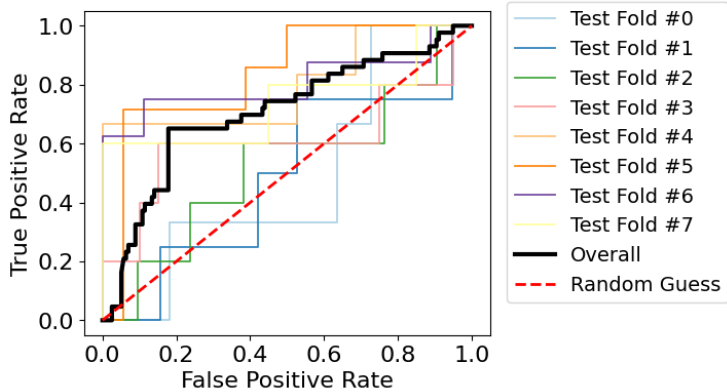


Identity-Specific Decoding of an Individual's Identity

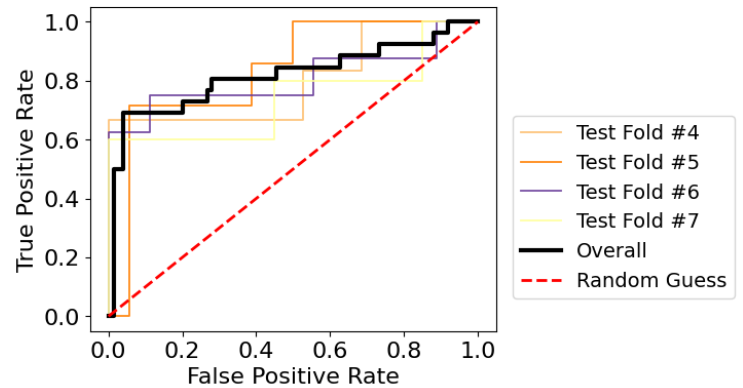
Hades observing the face or voice of her sister, Hermes (#46).

```
predictive population for i_hermes: mean overall auc = 0.6440 +/- 0.0313 (N_pred_tbins=23) ==> AUC=0.4848
predictive population for i_hermes: mean overall auc = 0.6380 +/- 0.0333 (N_pred_tbins=18) ==> AUC=0.4868
predictive population for i_hermes: mean overall auc = 0.6468 +/- 0.0294 (N_pred_tbins=16) ==> AUC=0.5524
predictive population for i_hermes: mean overall auc = 0.6460 +/- 0.0277 (N_pred_tbins=19) ==> AUC=0.6100
predictive population for i_hermes: mean overall auc = 0.6544 +/- 0.0243 (N_pred_tbins=19) ==> AUC=0.7982
predictive population for i_hermes: mean overall auc = 0.6483 +/- 0.0267 (N_pred_tbins=17) ==> AUC=0.8333
predictive population for i_hermes: mean overall auc = 0.6553 +/- 0.0289 (N_pred_tbins=14) ==> AUC=0.8056
predictive population for i_hermes: mean overall auc = 0.6436 +/- 0.0305 (N_pred_tbins=17) ==> AUC=0.8000
tested with mean_num_features=17.8750 for session #46: mean AUC: 0.6714
```

All Testing Folds
Face Or Voice of Hermes



All Testing Folds with AUC>0.65
Face Or Voice of Hermes

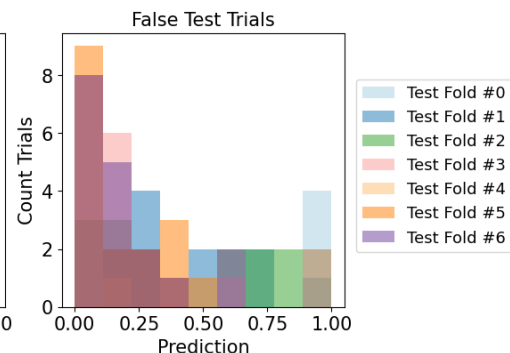
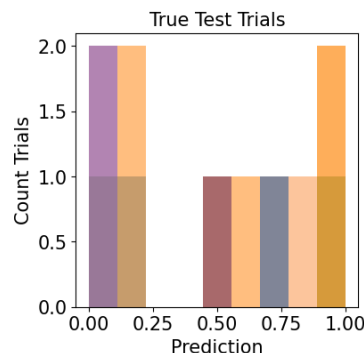
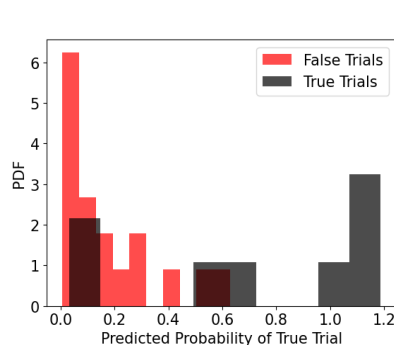


```
i_on_i: AUC: 0.7060, num_trials: 200
ideal threshold: 0.5000 ==> tpr: 0.6512, fpr: 0.1783
```

```
for fold #4, overall testing auc was auc=0.7982.
for fold #5, overall testing auc was auc=0.8333.
for fold #6, overall testing auc was auc=0.8056.
for fold #7, overall testing auc was auc=0.7400.
```

```
i_on_i: AUC: 0.8179, num_trials: 200
ideal threshold: 0.5000 ==> tpr: 0.6923, fpr: 0.0400
```

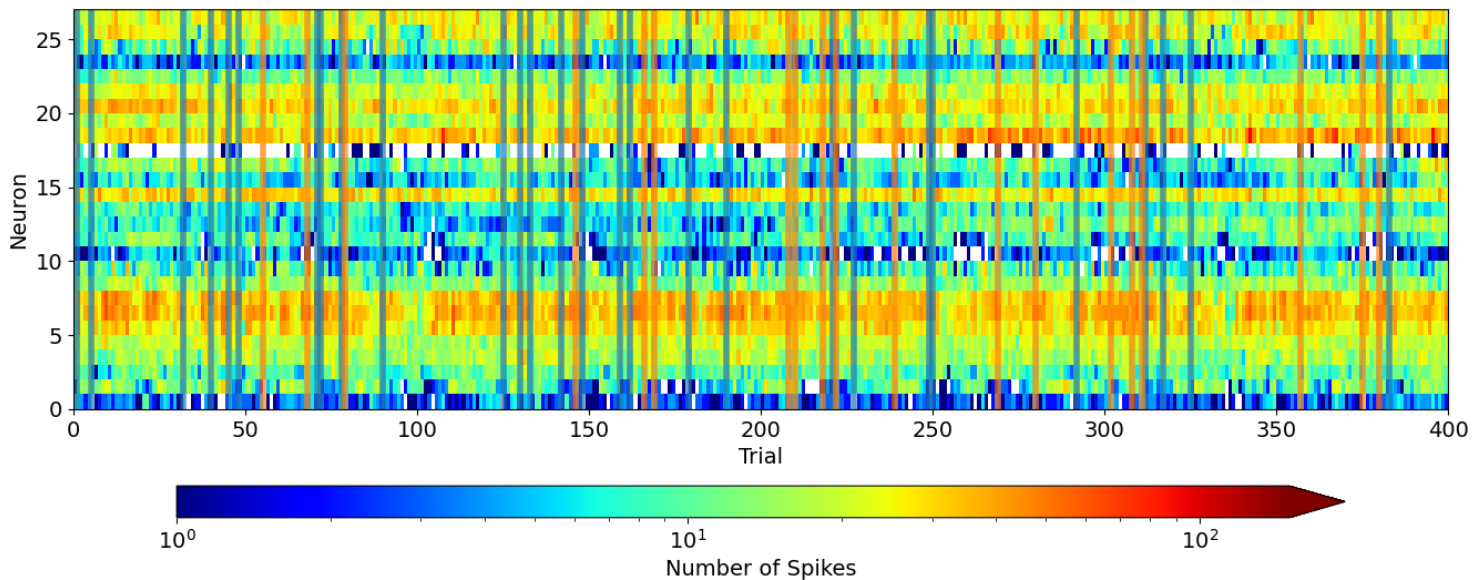
Histograms of the predicted probability that the face or voice of Hermes is present



Horizontal bars indicate all misclassifications predicted by a population-level neural decoder that considered all trials.

Perhaps something distinguishes (blue) false positives or (orange) false negatives from the remaining test trials. Different subtypes of responses to modal stimuli could explain why the decoder produced these errors.

Spike Counts For Predictive Neurons



No Error No Spikes One Spike FR Exceeds Max False Positive False Negative

Warnings For Predictive Neurons

