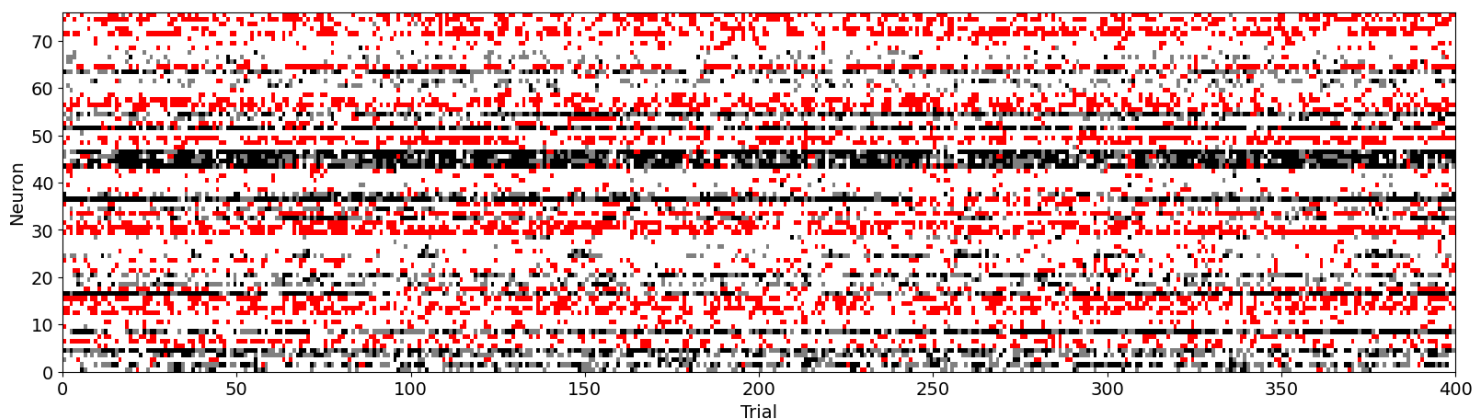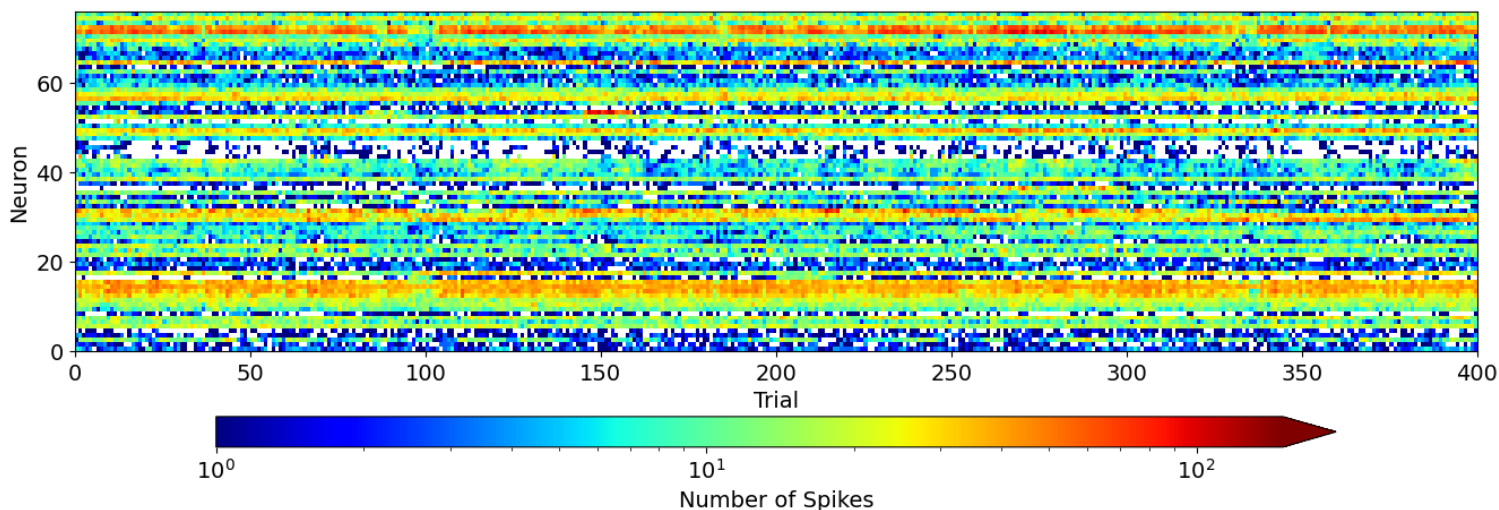Simple method of removing trials with obvious recording errors. Having >250 trials with (red) warnings lead to the removal of a neuron.

No Error   No Spikes   One Spike   Exceeds Max FR

Warning For All Trials

Spike Counts For All Trials

Number of Spikes

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.

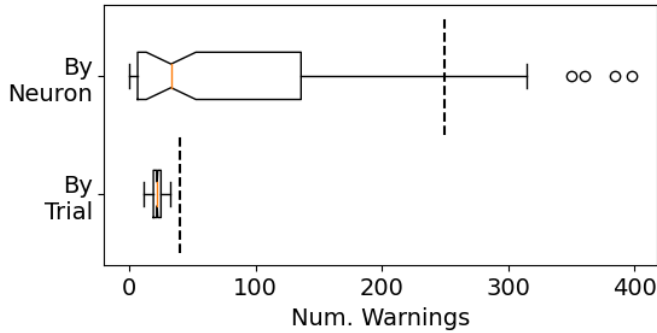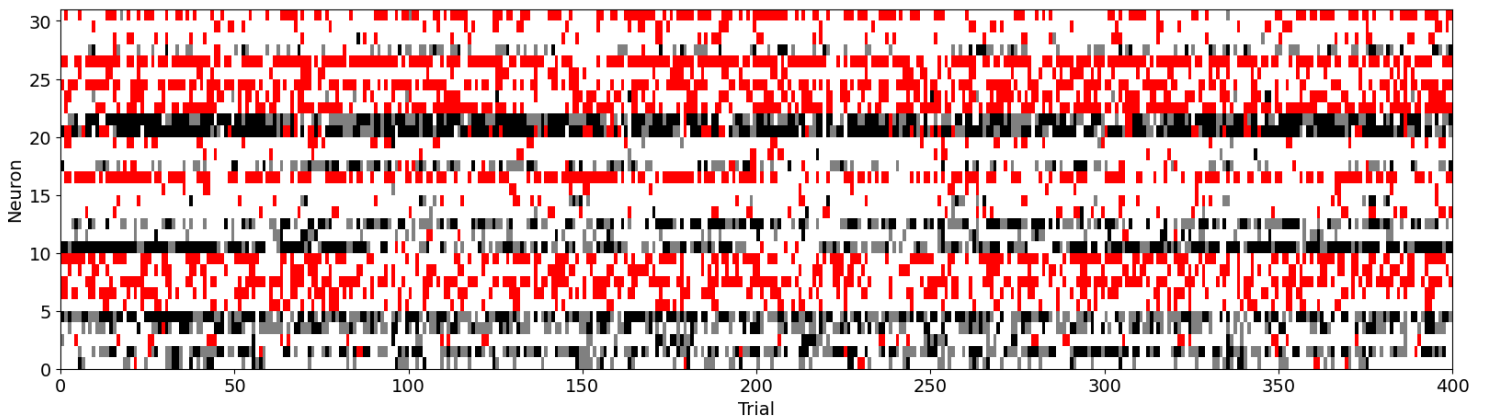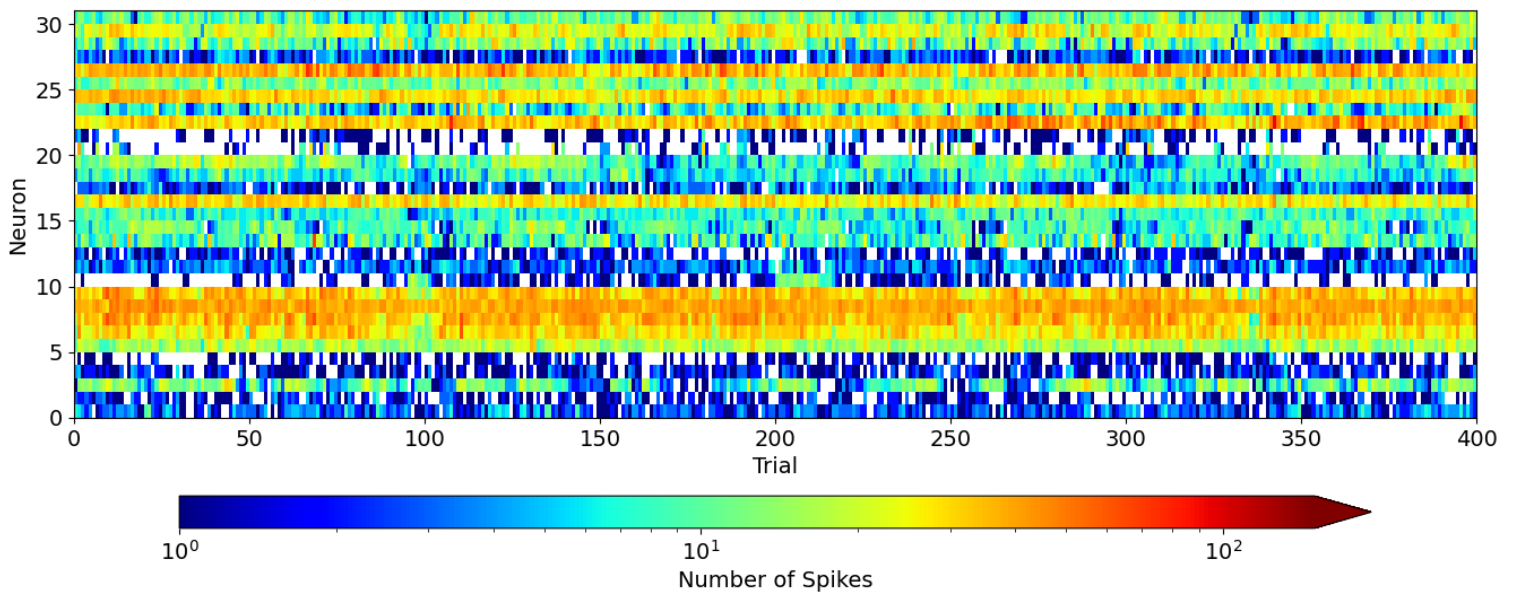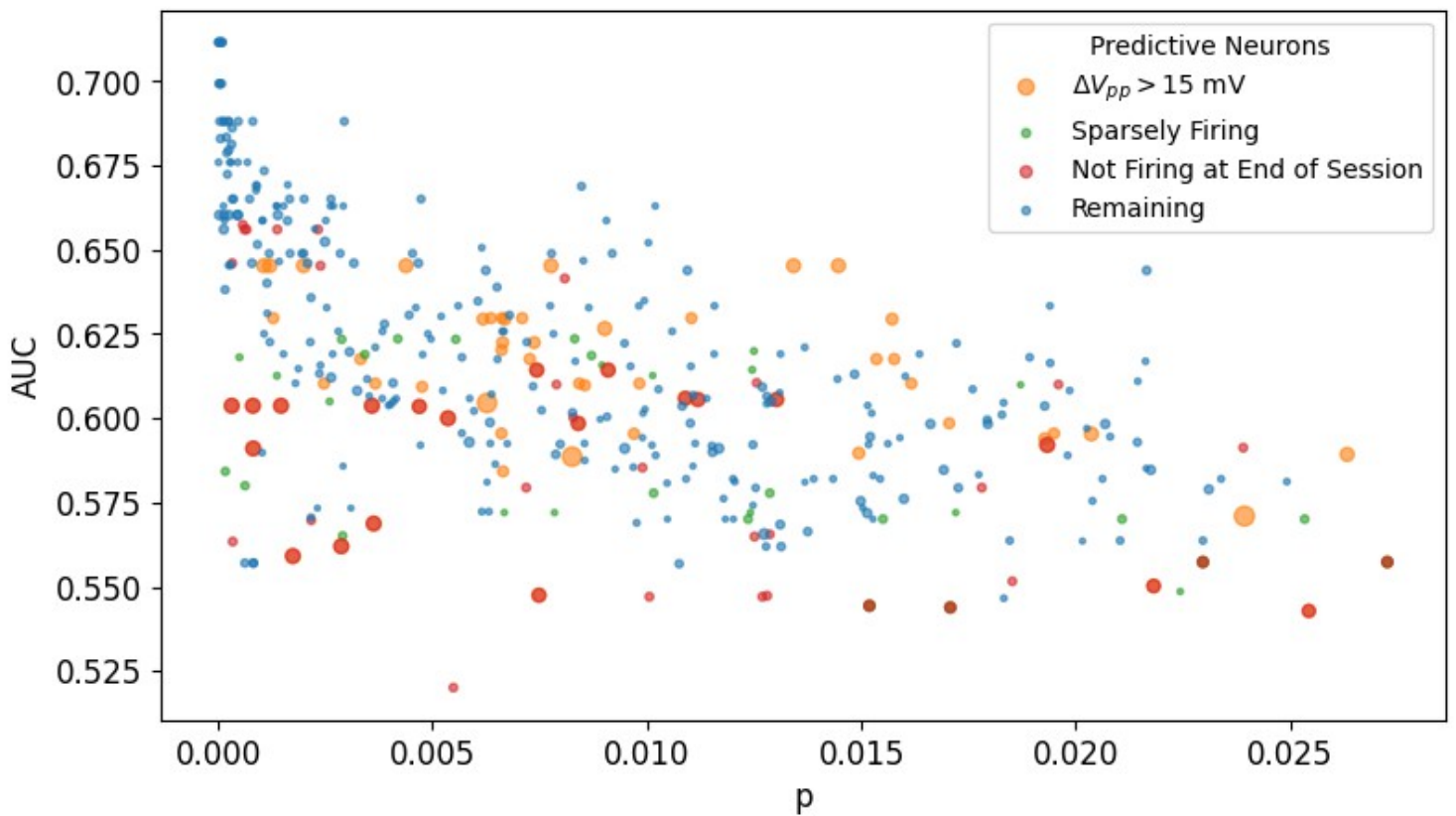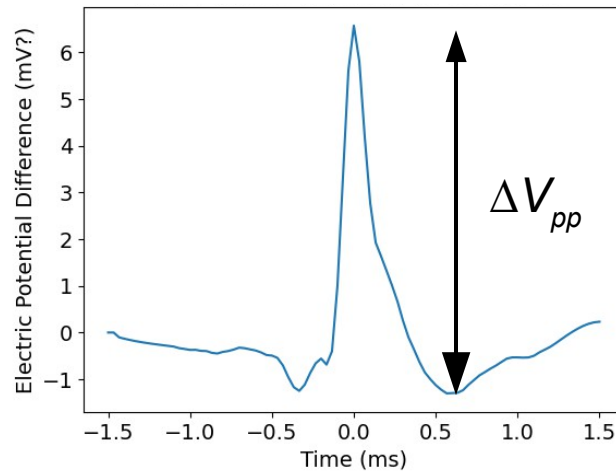No Error   **No Spikes**   One Spike   Exceeds Max FR

Warnings For Predictive Neurons

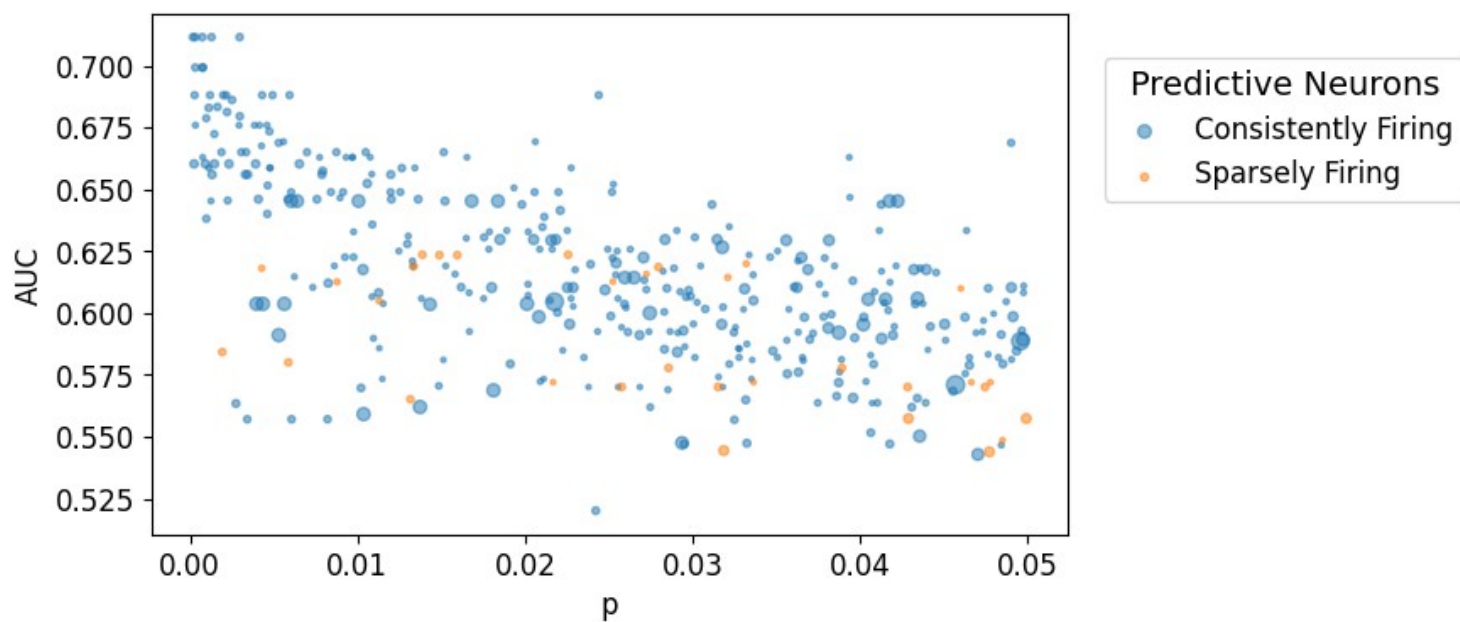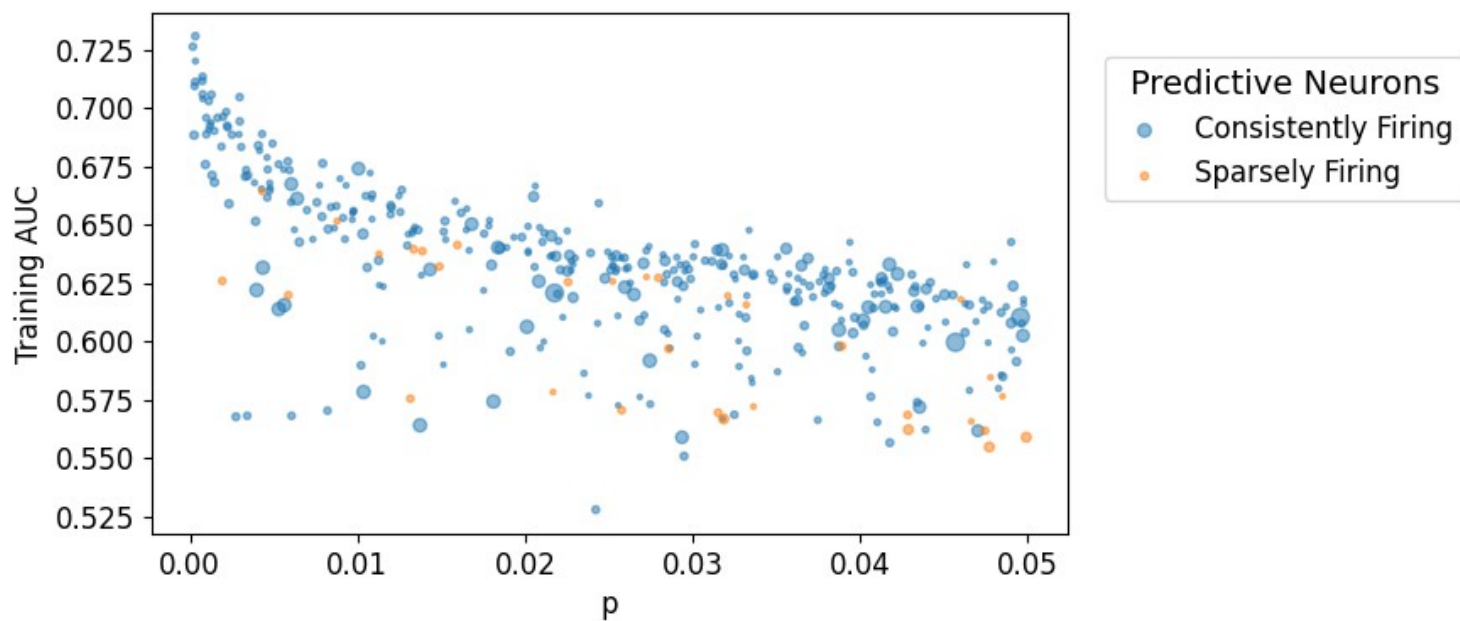Spike Counts For Predictive Neurons

Number of Spikes

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
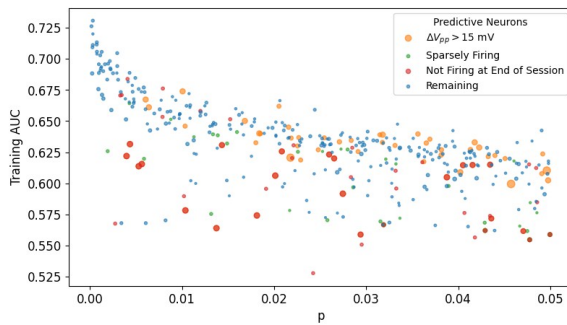
Classic
training p value

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*)
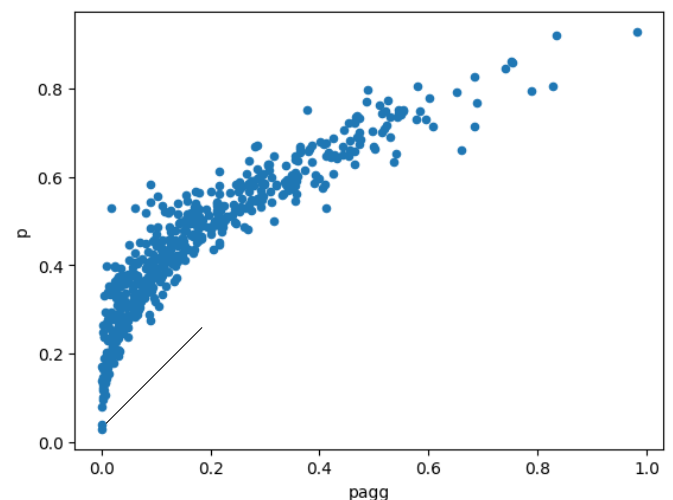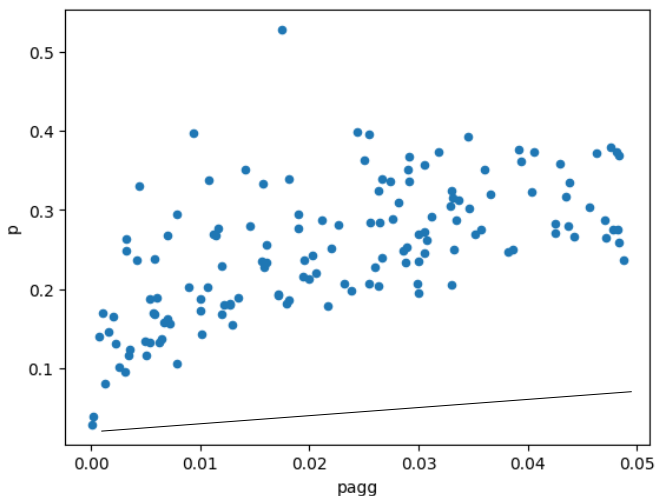
Training p (pagg) versus median training p *(Session #8)*
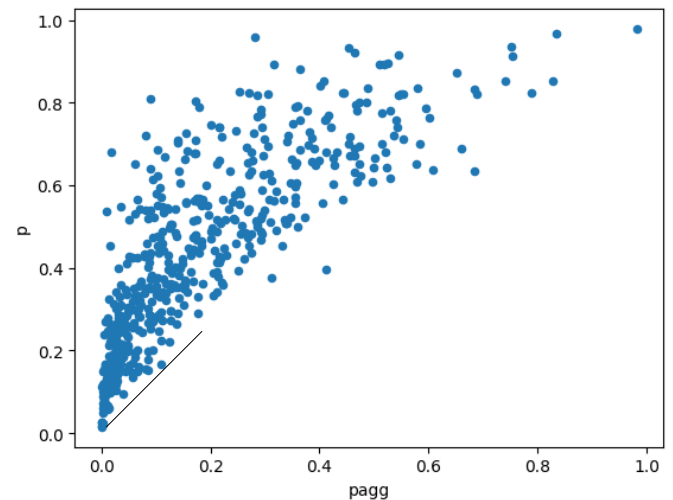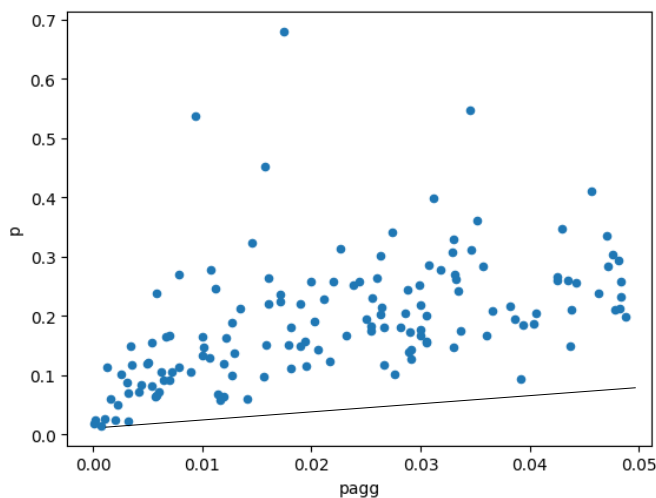
Hades observing the face or voice of her sister, Hermes (#46).

Mean
training p value
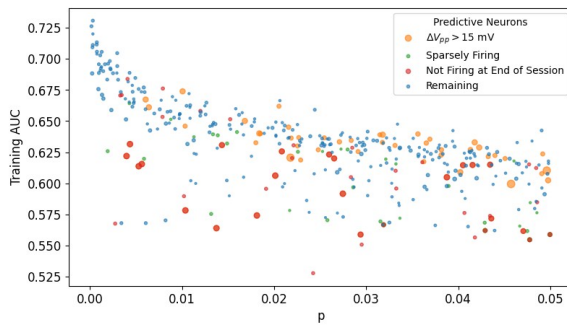
Classic
training p value
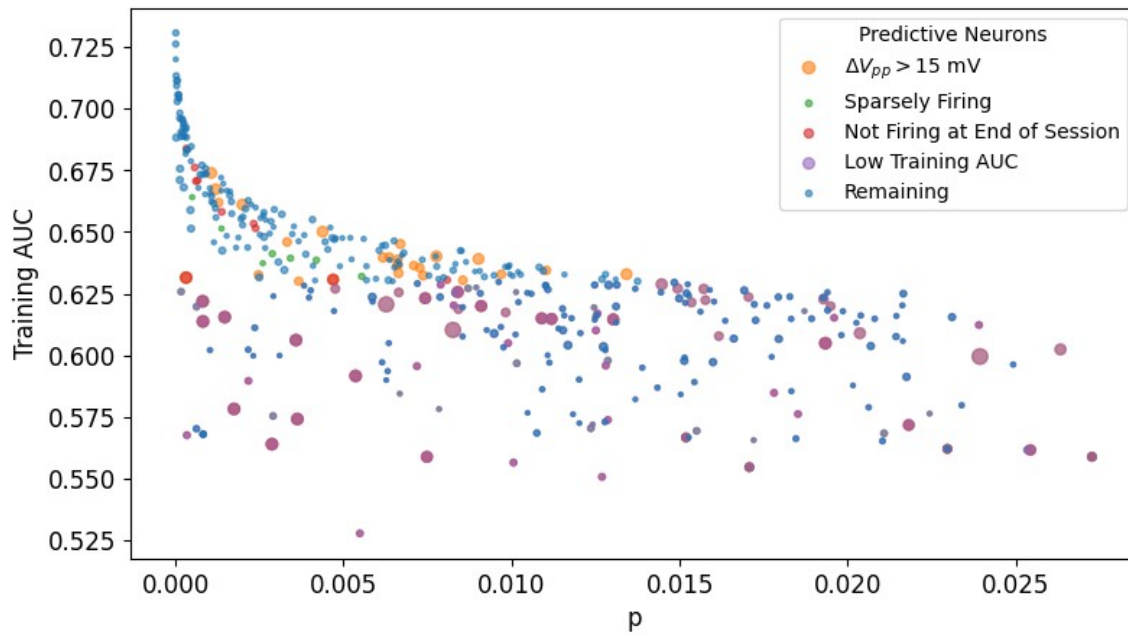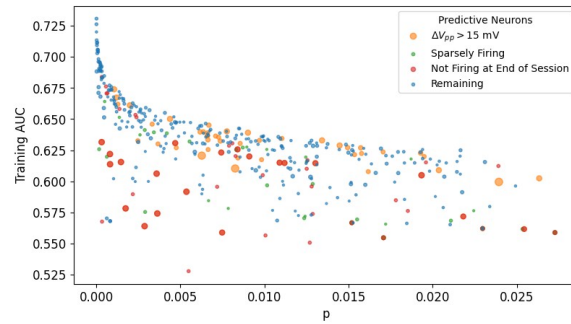
Train and test decoders only with these (green) predictive time bins
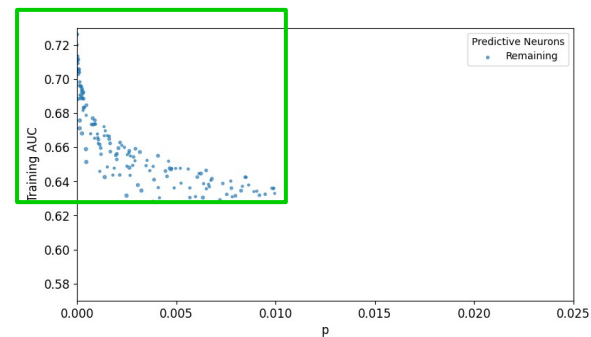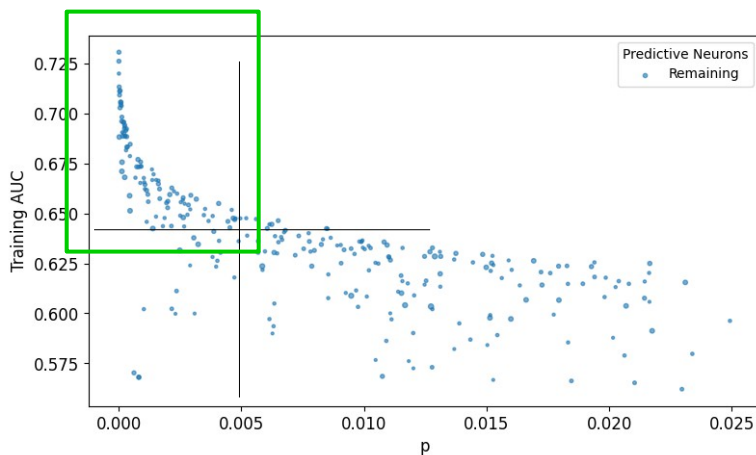
Spike counts of Predictive Neurons

Spike Counts For Predictive Neurons
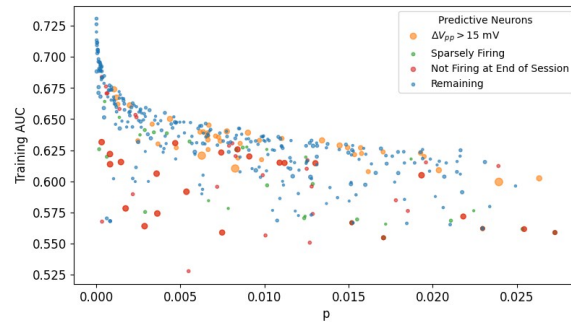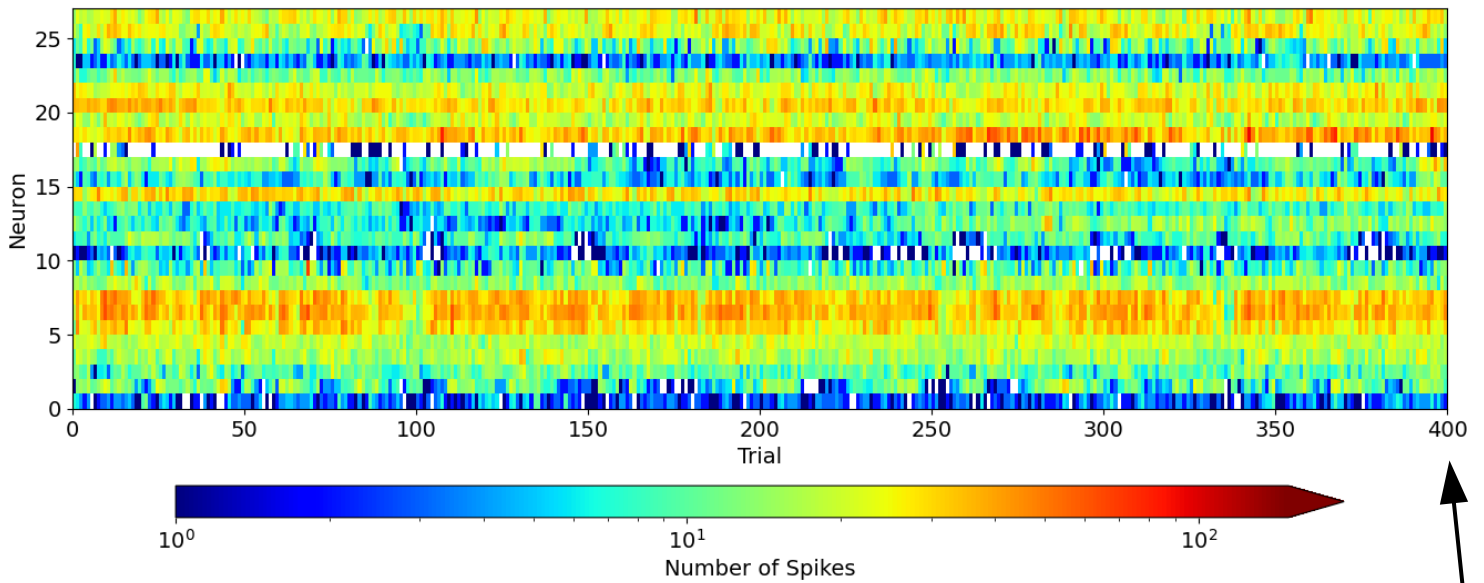

After filtering predictive time bins

No Error   ■ No Spikes   ■ One Spike   ■ FR Exceeds Max

Warnings For Predictive Neurons
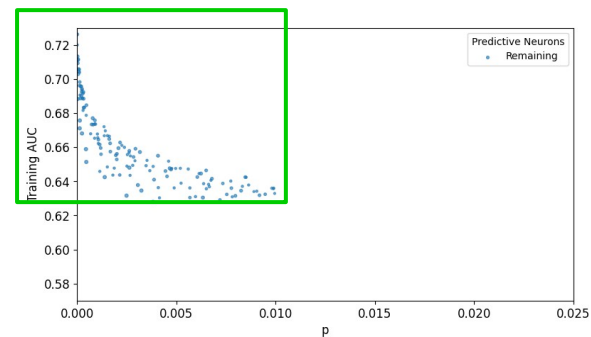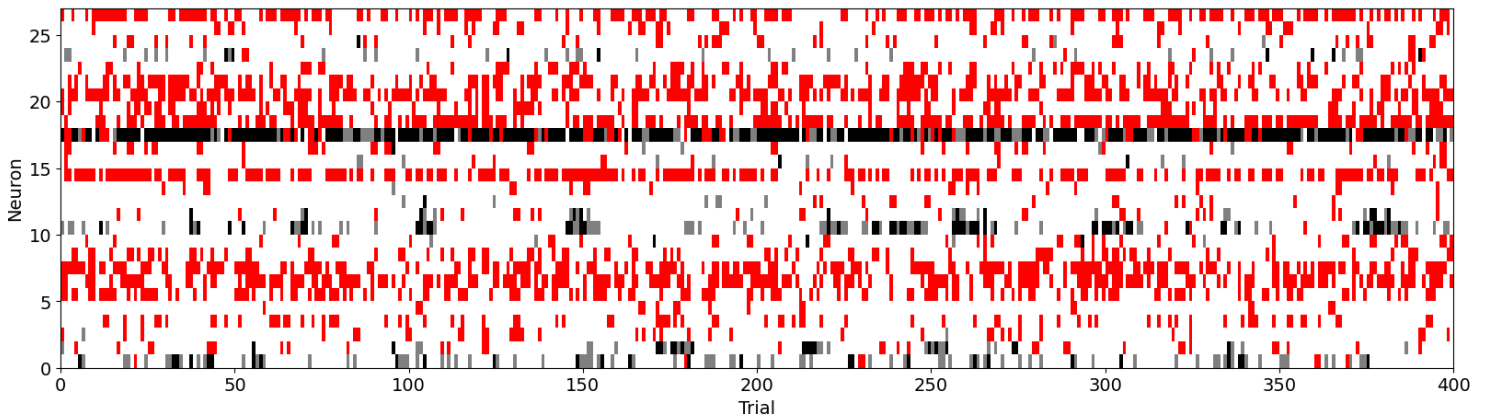
Spike Sorting Templates of predictive neurons before/after filtering (#46)
(note the change in max ΔV_{pp}.)

Before filtering predictive time bins
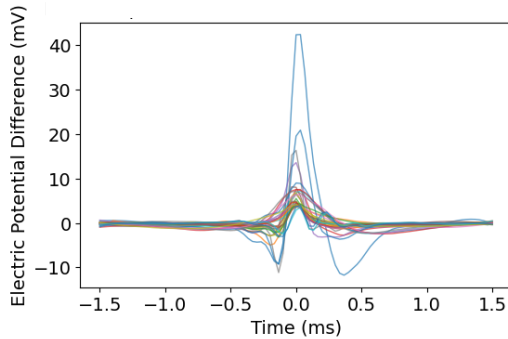
Predictive Neurons

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

Final Template Waveforms (Session #46)
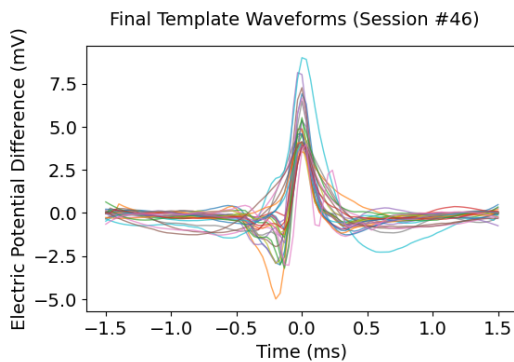
Predictive Neurons

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} ....

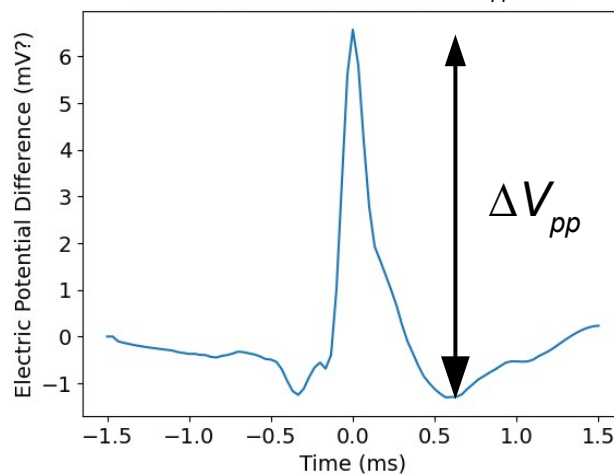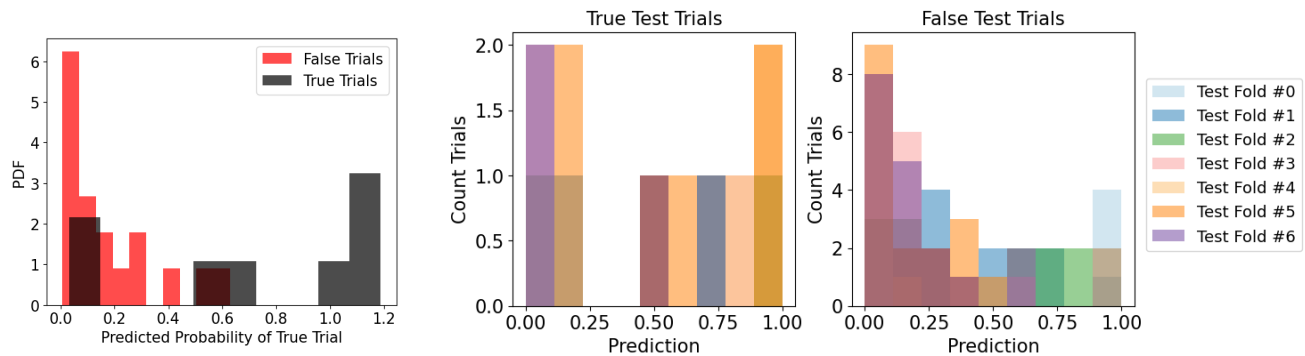# Identity-Specific Decoding of an Individual's Identity

# 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
```

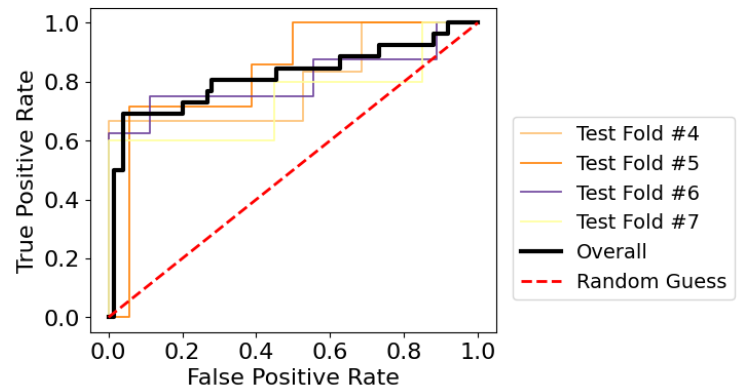## *Histograms of the predicted probability that the face or voice of Hermes is present*
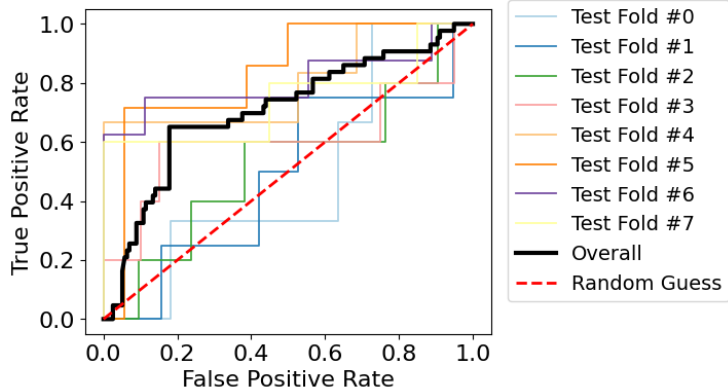
All Testing Folds   *All Testing Folds with AUC>0.65*


```
(left)
i_on_i: AUC: 0.7060, num_trials: 400
    ideal threshold: 0.5000 ==> tpr: 0.6512, fpr: 0.1783


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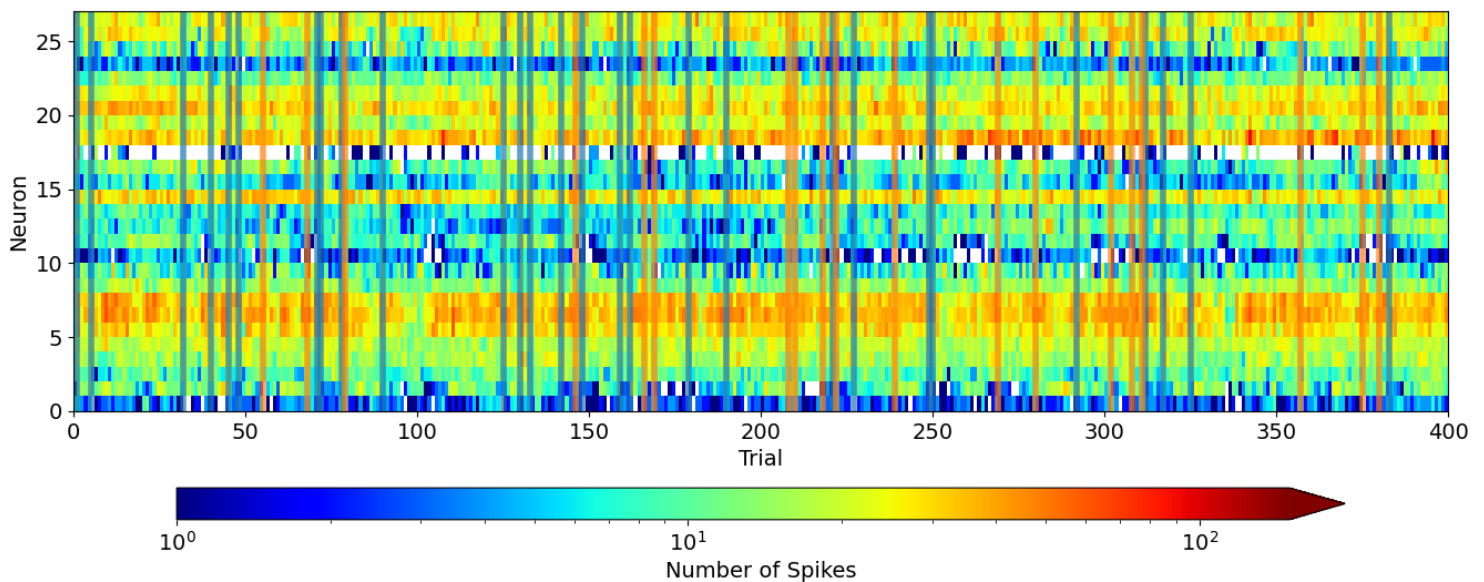
Horizontal bars indicate all misclassifications predicted by a population-level neural decoder that considered all trials.

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

Warnings For Predictive Neurons