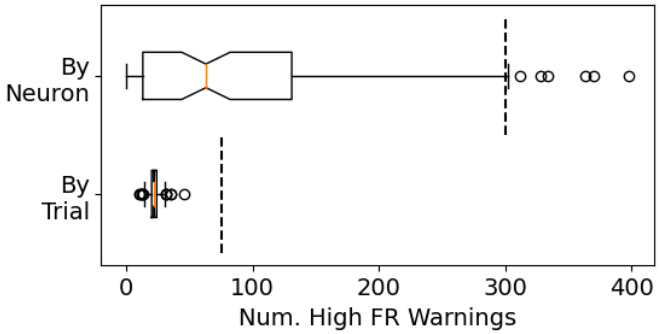
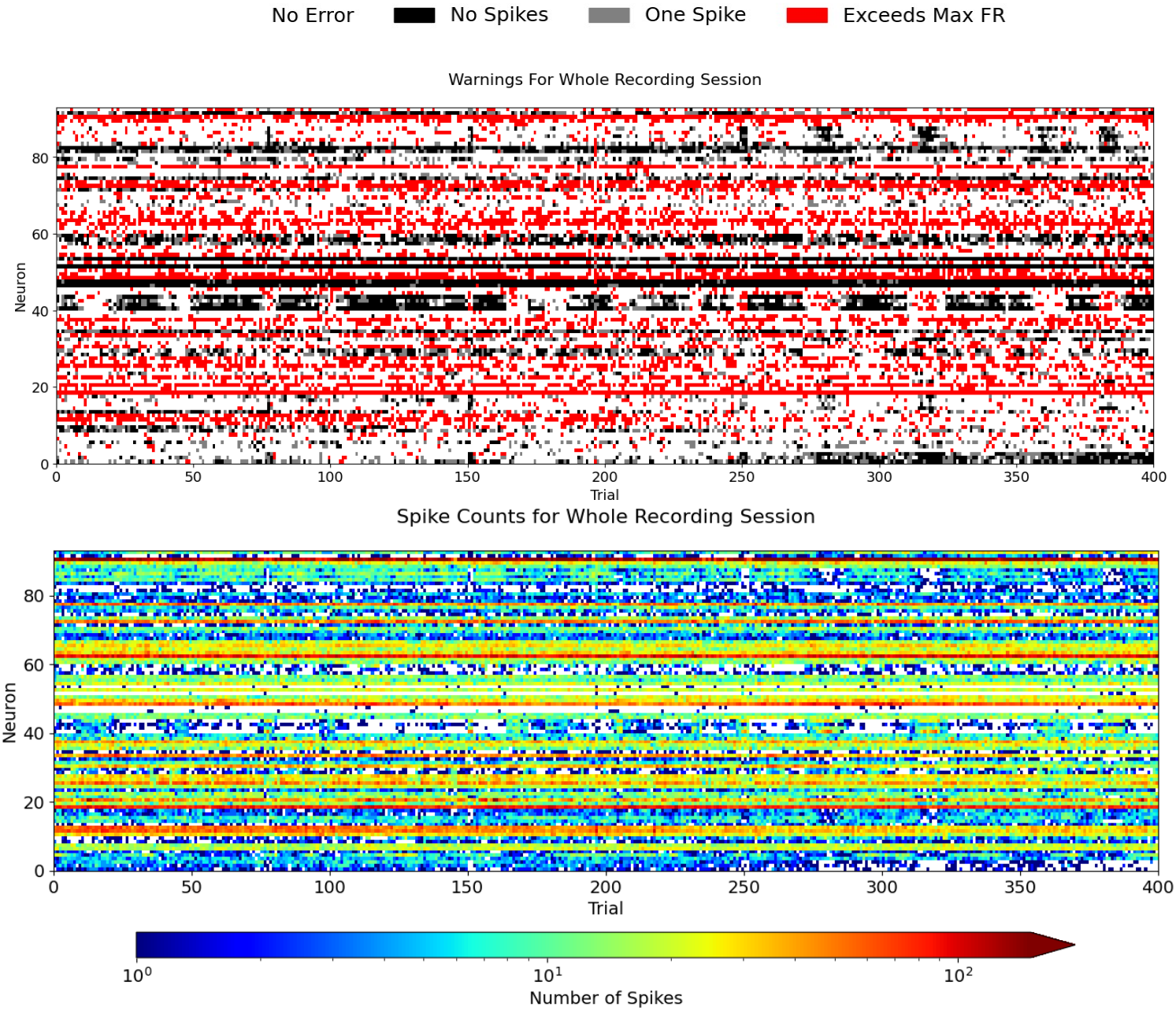
Figures generated by 'decoding_individual_identity.ipynb'

Source : https://github.com/timtyree/tbins.git

Session #46
Whole session plotted



Simple method of removing trials with obvious recording errors. Having >300 trials with (red) warnings leads to the removal of a neuron.



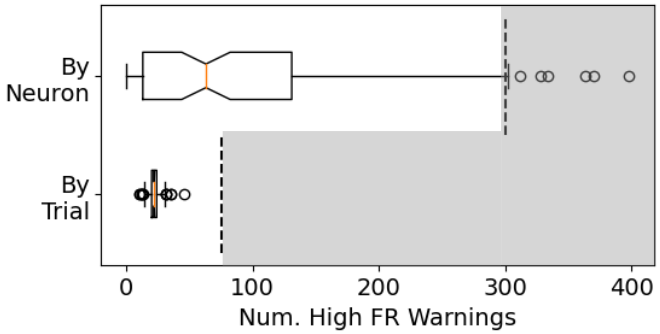
Figures generated by 'decoding_individual_identity.ipynb'

Source : https://github.com/timtyree/tbins.git

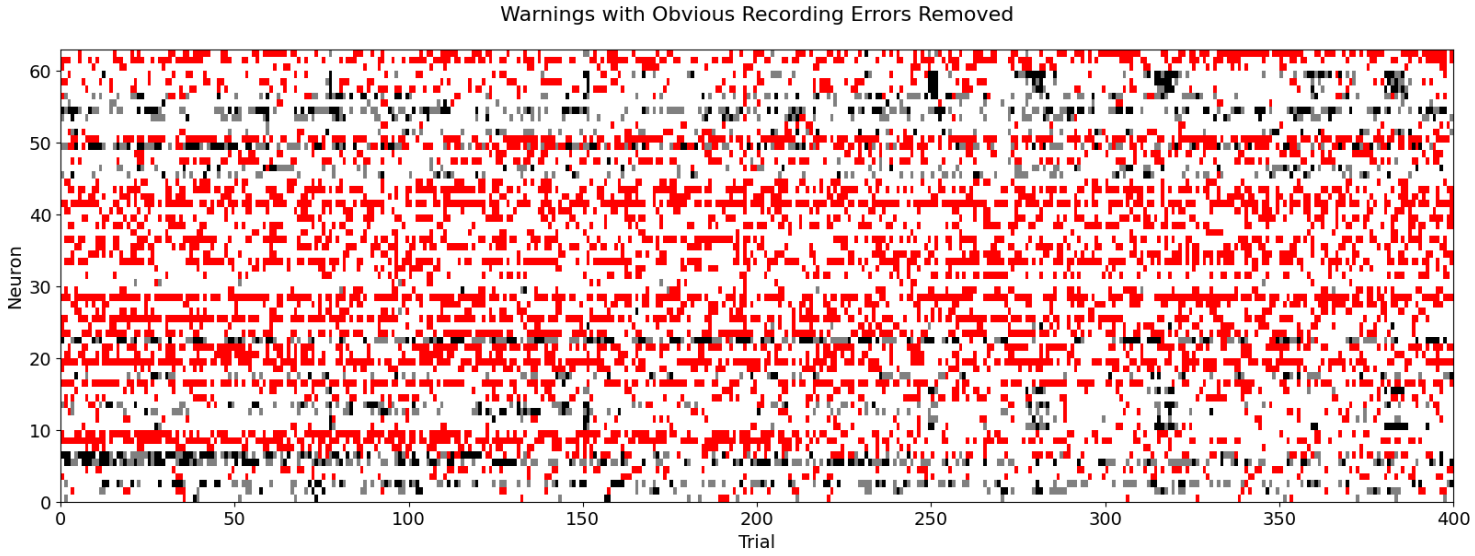
Session #46
Whole session plotted

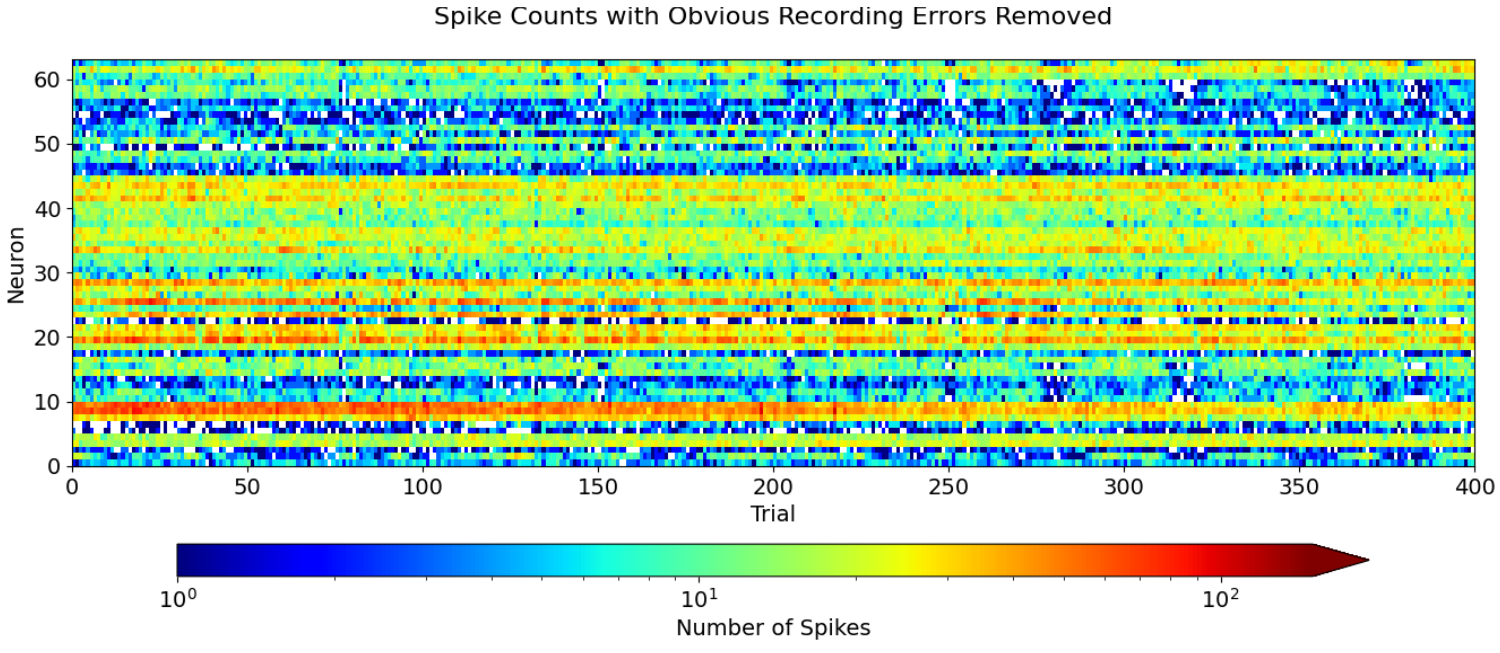
Remove neurons with unreasonably fast firing rates for most of the session.

Similarly, remove neurons that aren't firing for unreasonably large amounts of time.

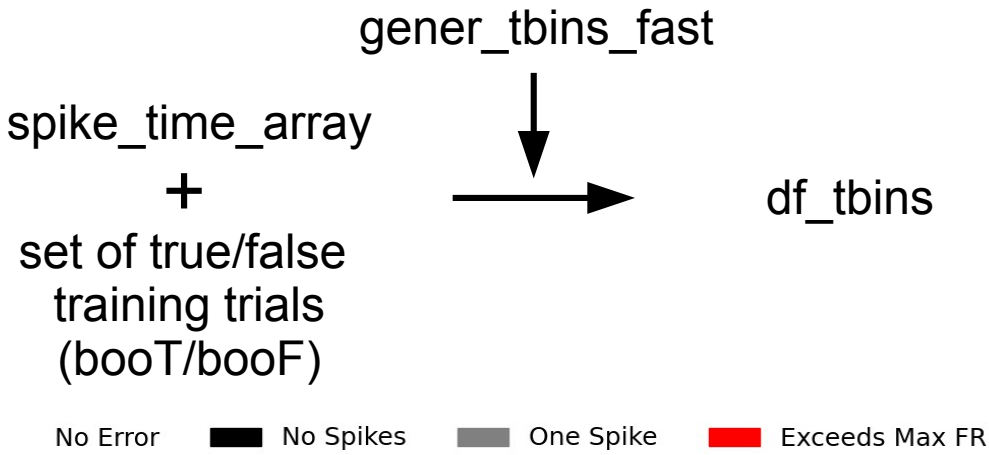


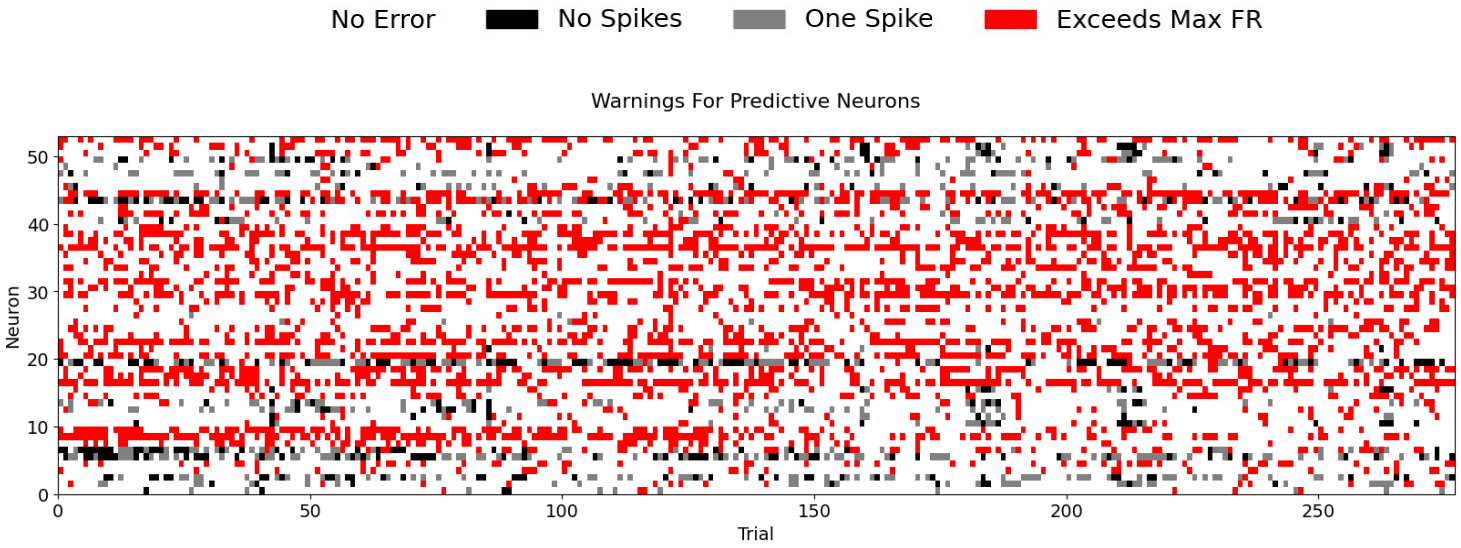
Simple method of removing trials with obvious recording errors. Having >300 trials with (red) warnings leads to the removal of a neuron.

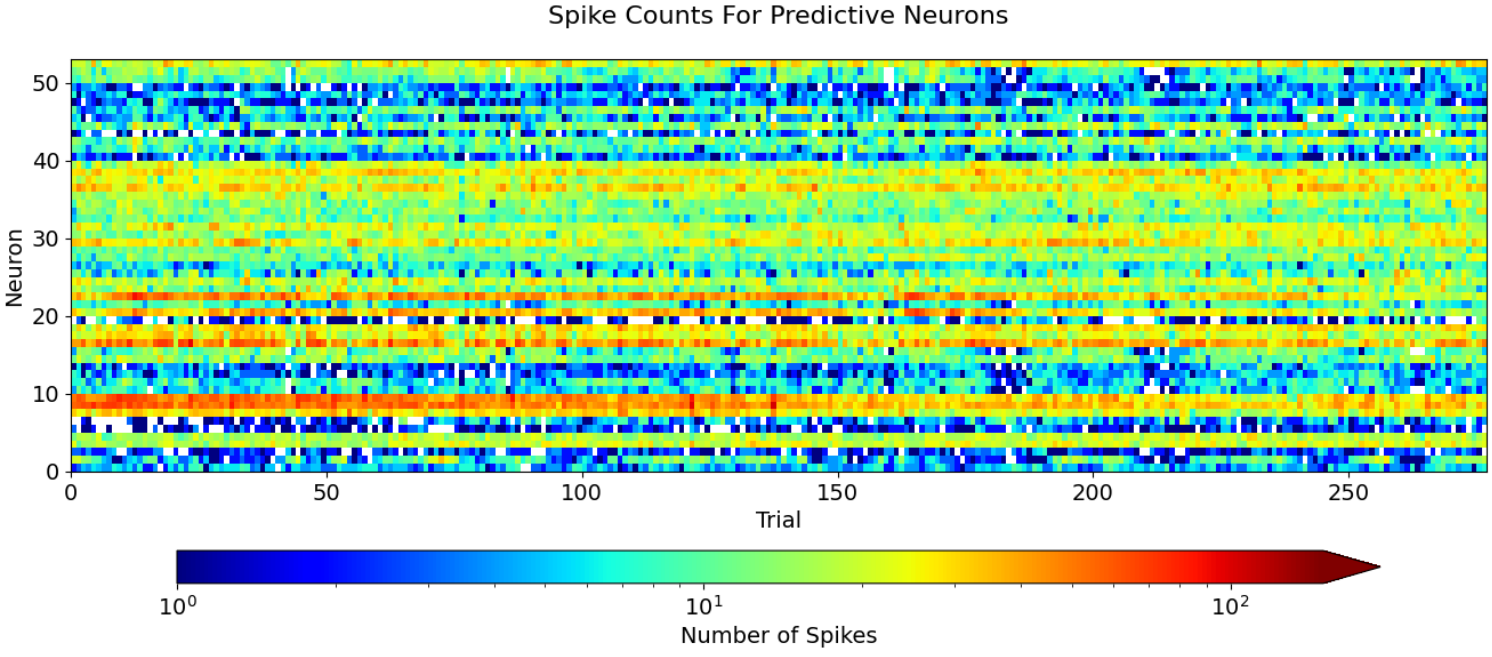




Apparent Predictive Neurons (#46)

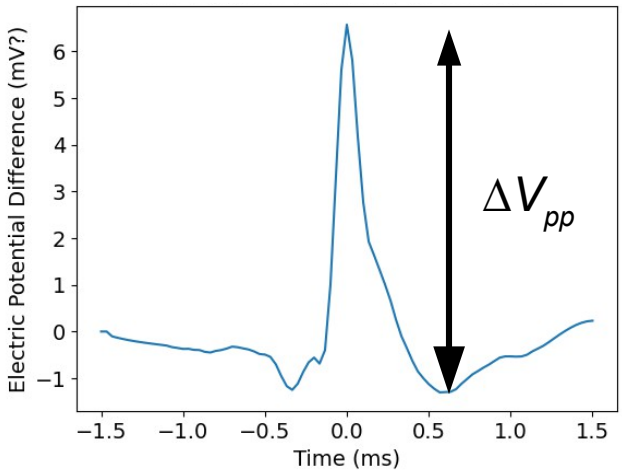




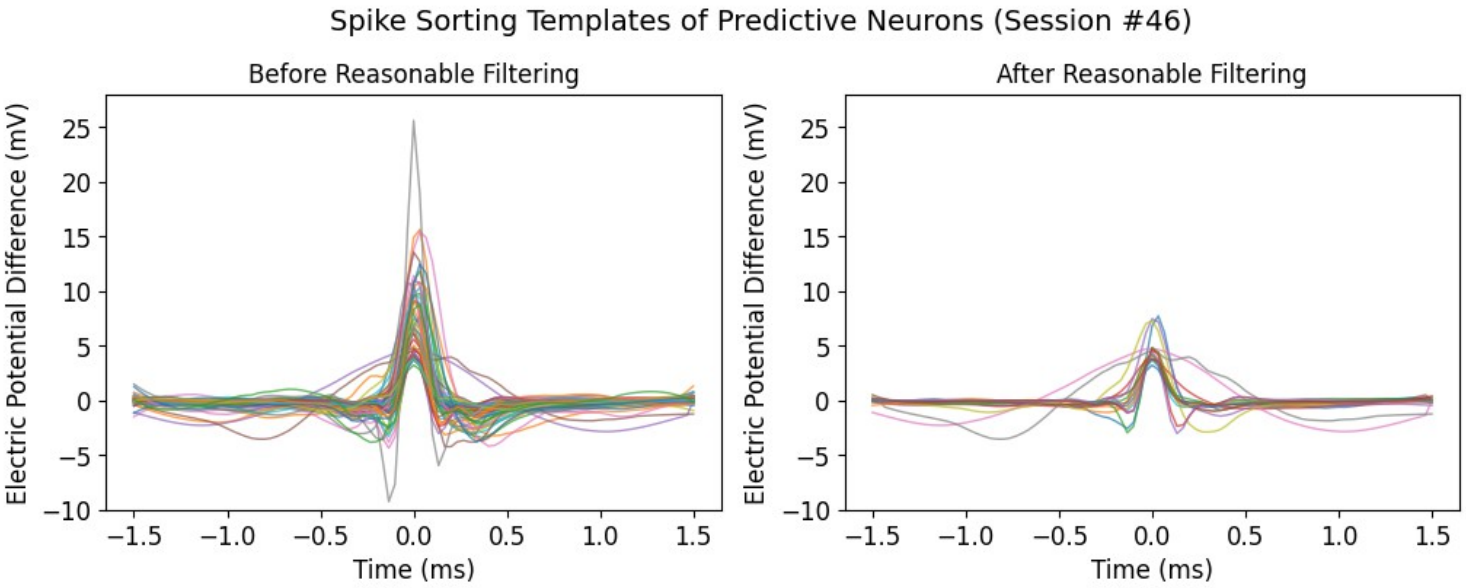


Apparent Predictive Neurons (#46)

Larger spike amplitudes tend to offer worse prediction from an apparent predictive time bins.



(note the change in max ΔV_{pp}.)



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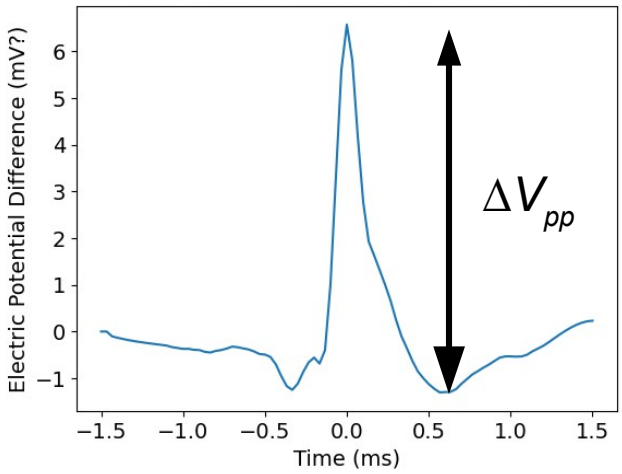
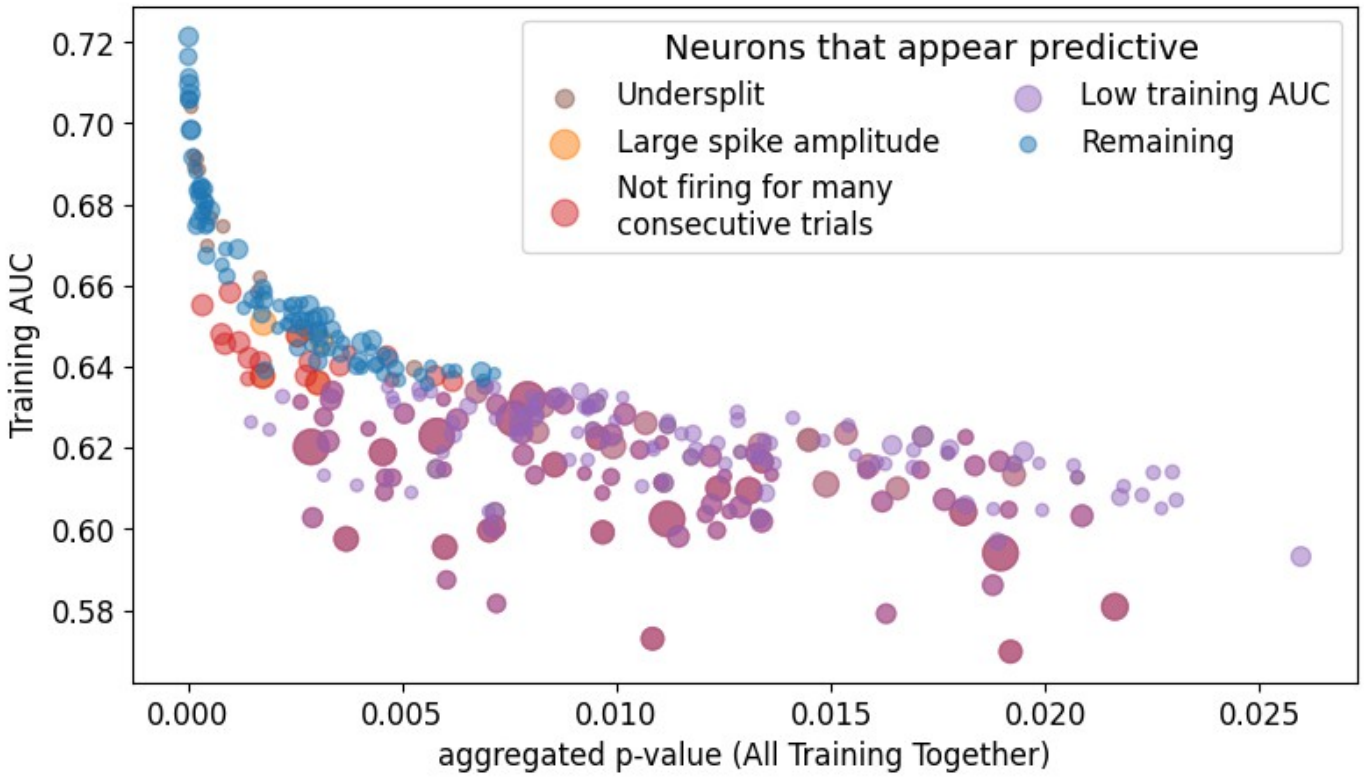


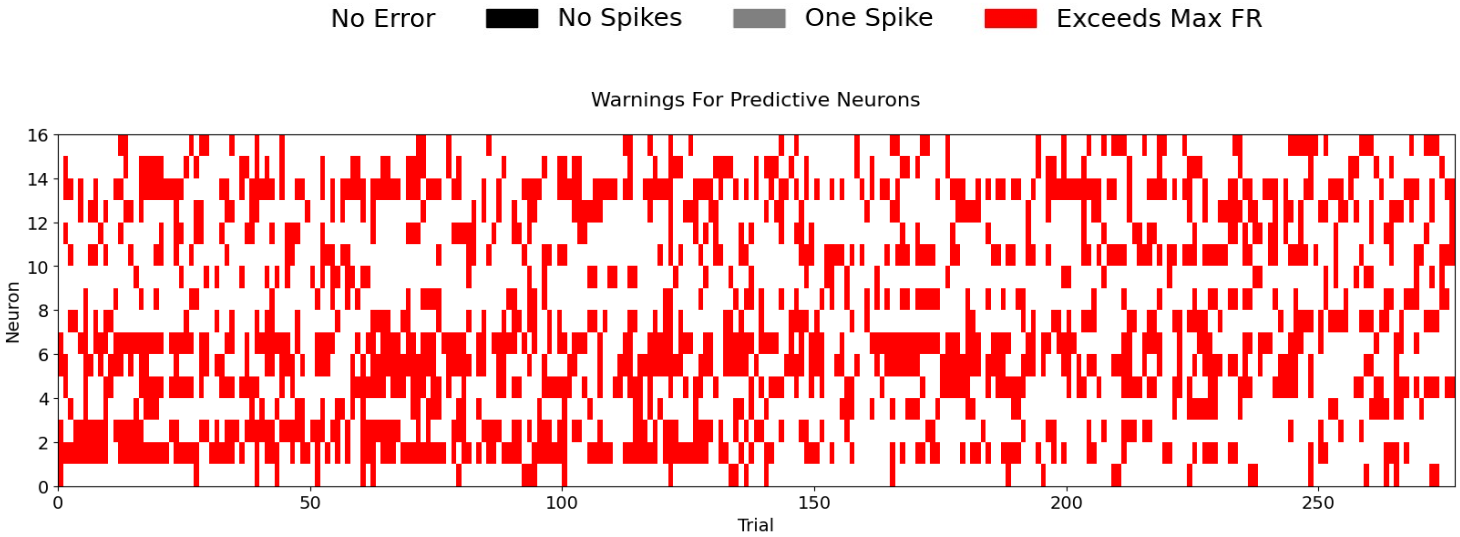
Large spike amplitudes together with other reasonable arguments lead to the selective removal of tbins that tend to fail to generalize.



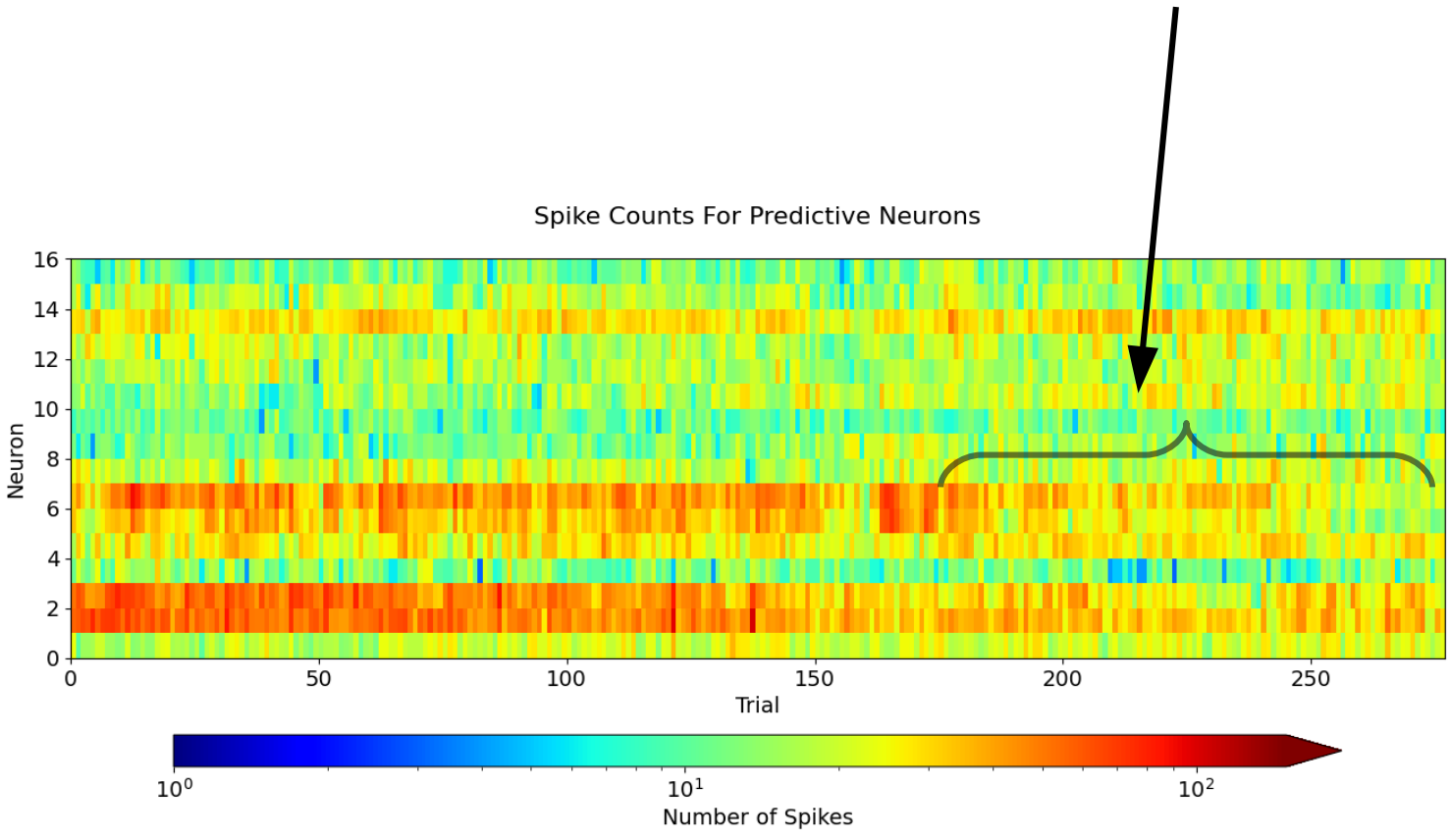
Sparsely firing neurons might be oversplit during spike sorting. It's exceptionally difficult to tell oversplit units from properly categorized pyramidal cells.

Predictive Neurons *(#46)*

After reasonable filtering, we see fewer warnings

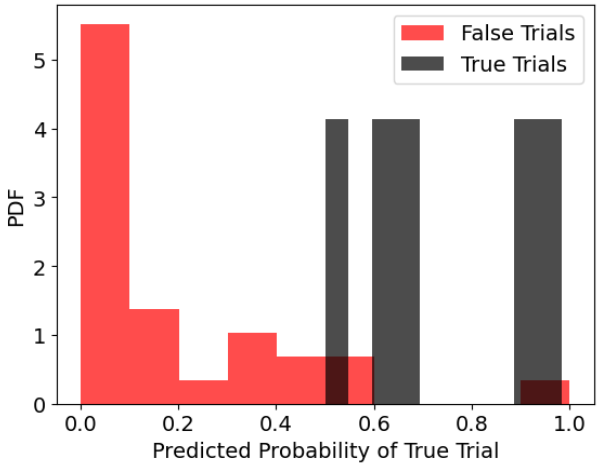


It looks like some neurons are firing less as the session goes on...



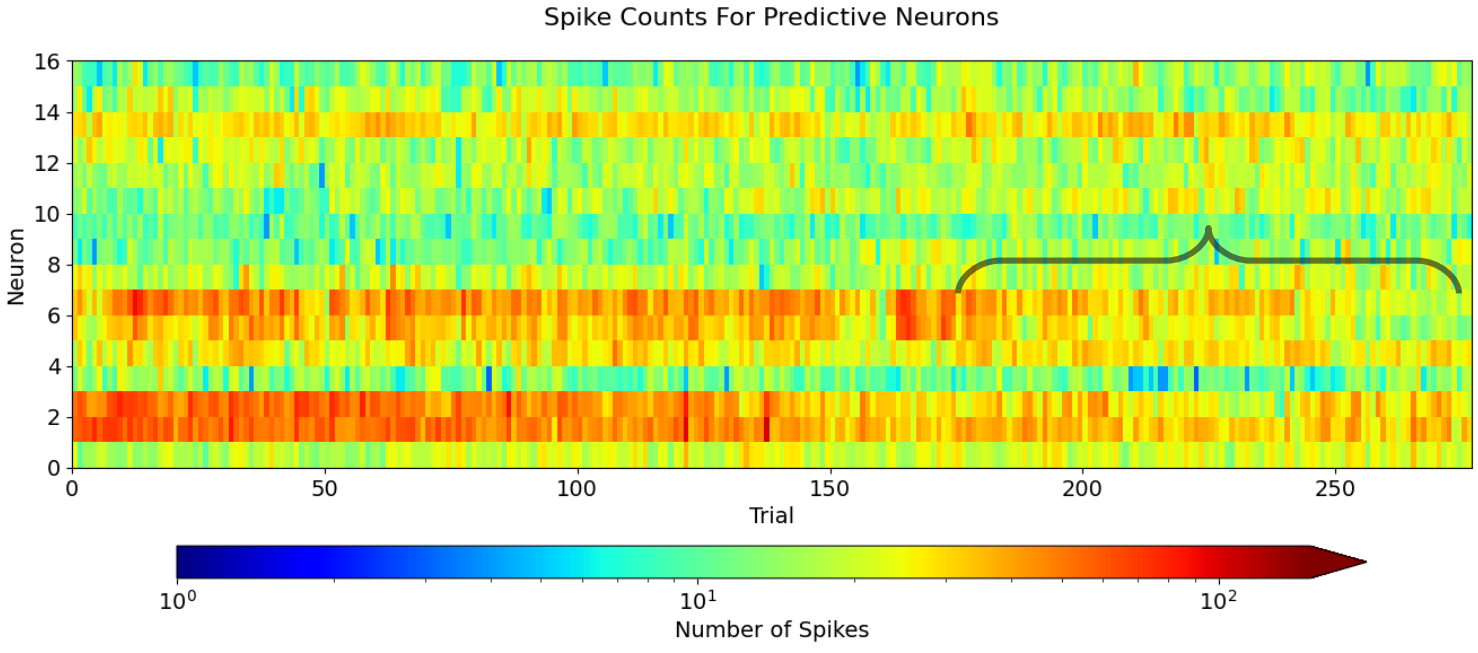
Predictive Neurons
after reasonable filtering (#46)

A random train-test split revealed exceptional separation for whether Hades was observing her sister, Hermes.



No Error No Spikes One Spike Exceeds Max FR

```
accuracy=0.9117647058823529
sensitivity=0.6666666666666666
specificity=0.9642857142857143
precision=0.8
negative_predictive_value=0.9310344827586207
auc=0.9517241379310345
num_true_testing=5
num_false_testing=29
num_features=11
num_samples_testing=34
num_true_testing=5
num_false_testing=29
**************************************************************************
* the accuracy of this population level decoder: 91.1765% (AUC=0.9517)
**************************************************************************
```

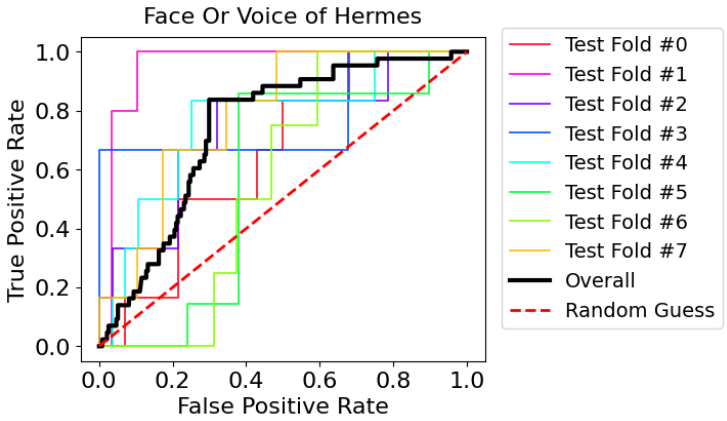


Identity-Specific Decoding of an Individual's Identity

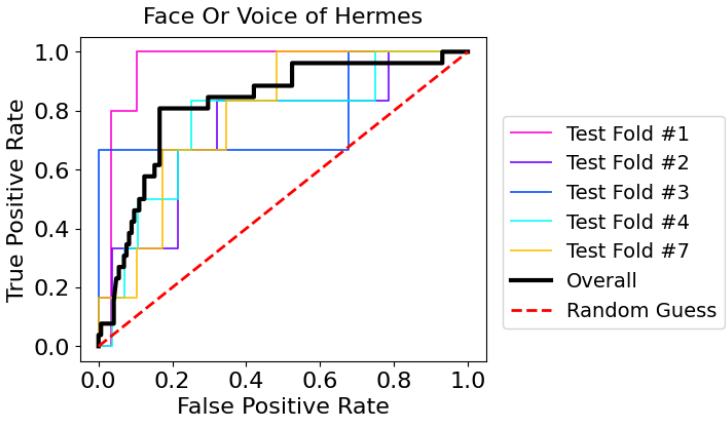
Hades observing the face or voice of her sister, Hermes (#46).

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: 0.7395, num_trials: 277
    threshold as 0.5000 ==> tpr: 0.8372, fpr: 0.2991
```

```
                                                    (right)
                    for fold #1, overall testing auc was auc=0.9517.
                    for fold #2, overall testing auc was auc=0.7381.
                    for fold #3, overall testing auc was auc=0.7742.
                    for fold #4, overall testing auc was auc=0.7619.
                    for fold #7, overall testing auc was auc=0.7874.
                                i_on_i: AUC: 0.8199, num_trials: 277
                threshold as  0.5000 ==> tpr: 0.8077, fpr: 0.1655
```

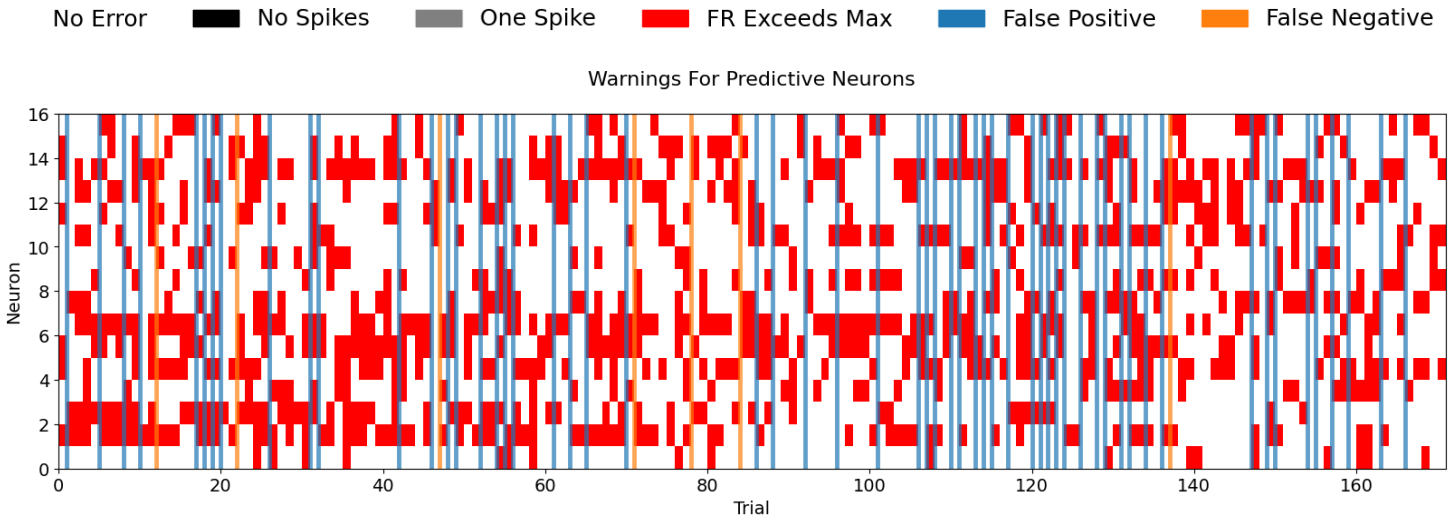
```
                *** test results  aggregated over testing folds ***
                                      25%,        50%,       75%,       count
testing auc:                          [0.62823276 0.75       0.80288283 8.        ]
testing accuracy:                     [0.6752451  0.73529412 0.76638655 8.        ]
testing sensitivity:                  [0.16346154 0.28181818 0.4        8.        ]
testing precision:                    [0.44642857 0.66666667 0.66666667 8.        ]
testing negative_predictive_value:    [0.71162403 0.76785714 0.80018473 8.        ]

                                      25%,   50%,  75%,   count
                num_true_testing:     [4.75  6.    6.     8.  ]
                num_false_testing:    [28.   29.   29.5   8.  ]
                num_features:         [11.75 13.   14.    8.  ]
```

Why did some folds perform poorly?

Horizontal bars indicate all misclassifications predicted by a population-level neural decoder

Shown are (blue) false positives or (orange) false negatives.



It looks like some neurons are firing less as the session goes on...

```
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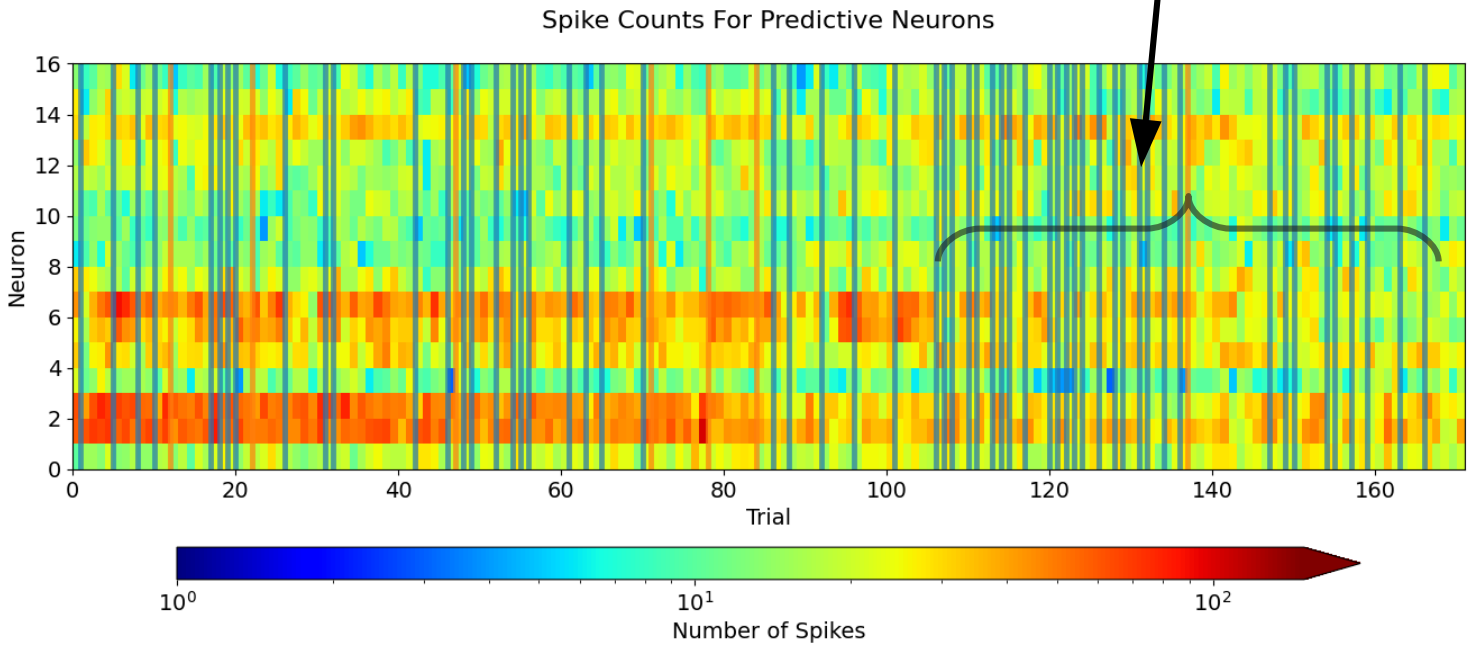
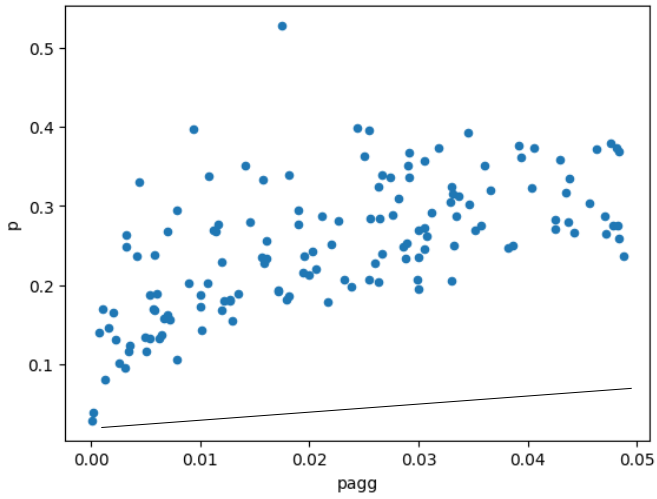


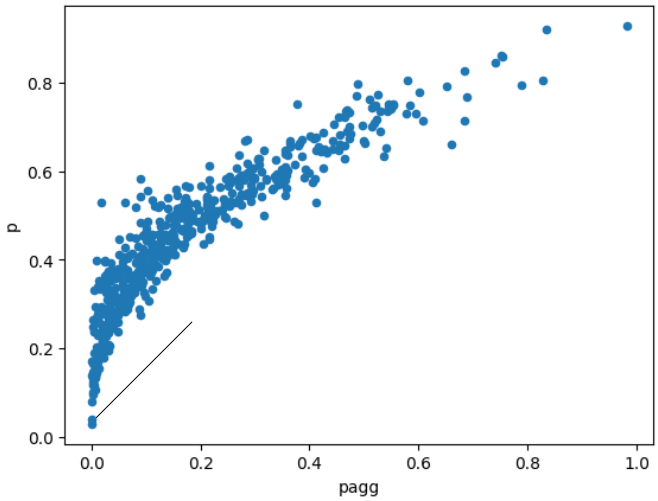
(Supplementary)

Demonstration that the (y-axis) mean p-statistic is sufficient

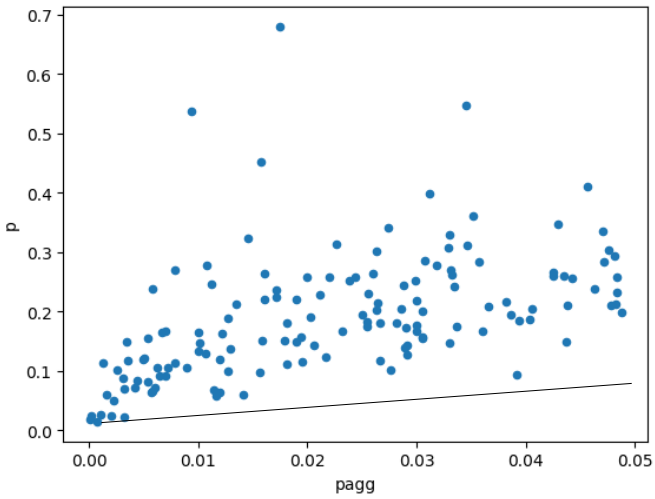
relative to (x-axis) Wilcoxon-Mann-Whitney test
conducted over all of the training trials (#8)

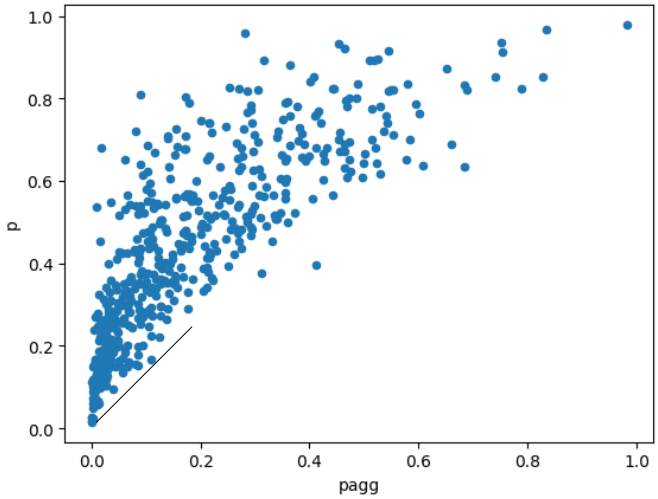
Training p (pagg) versus mean training p





Overall training p (pagg) versus median training p





Note the apparent difference in spread.
The mean appears tighter and more stable in its statistical sufficiency. This supports our use of mean p versus median p.

All of these p-values were computed
from the Wilcoxon-Mann-Whitney test
for significant difference in median value,
which makes no assumption of normality.