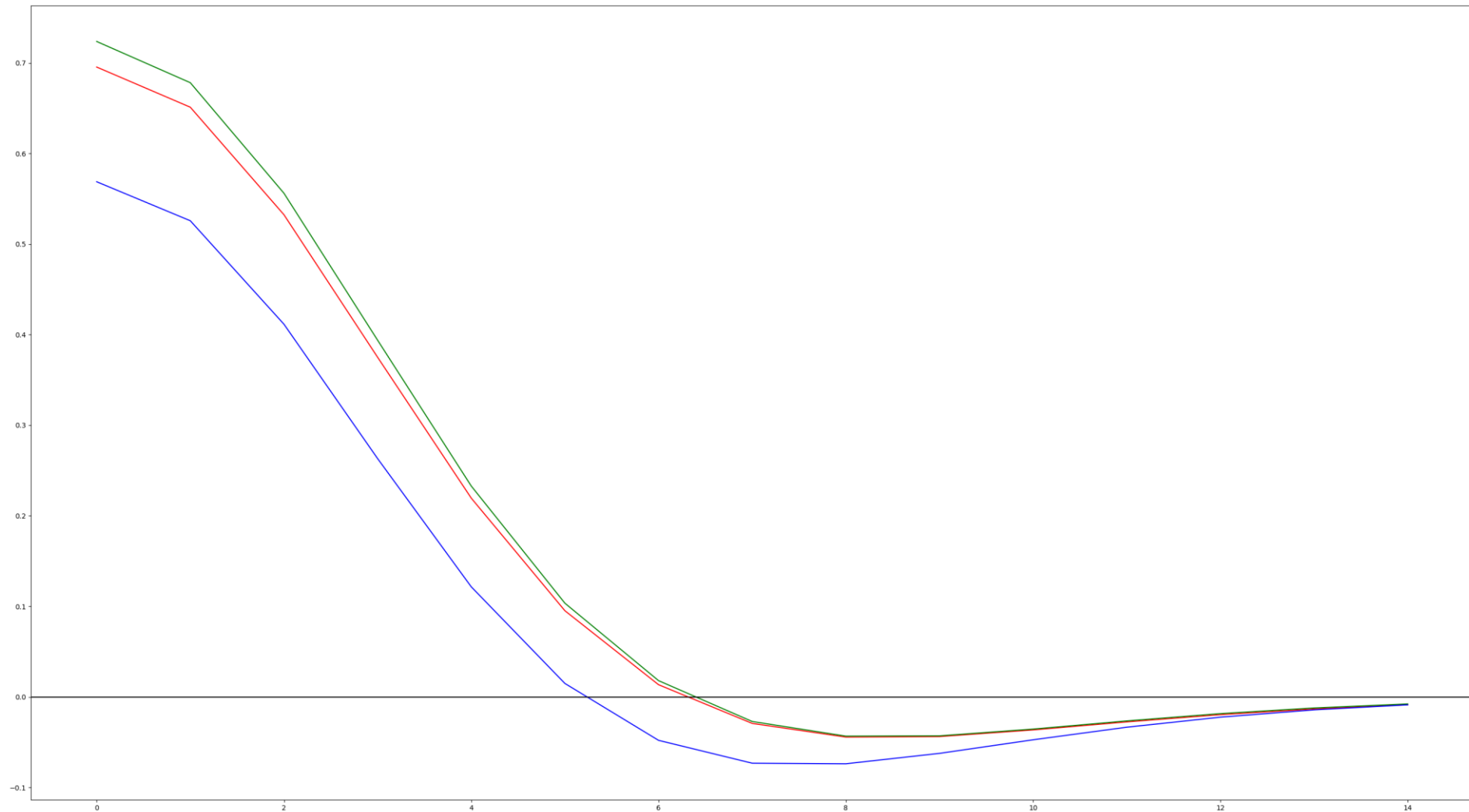# Plan for today (February 14th 2024)

1. Mosaics with zero-crossing

Discovered that we can get a full mosaic by "fusing" 2 types
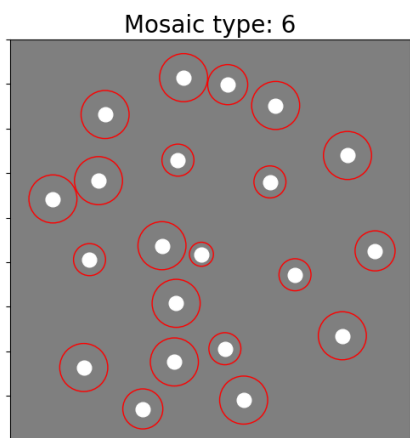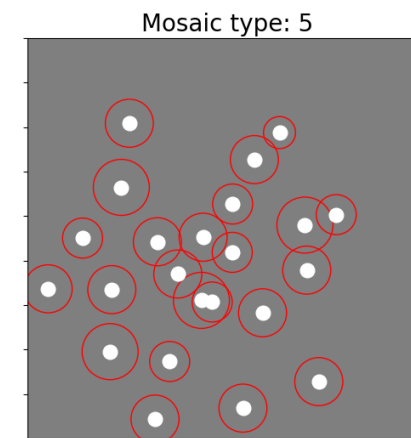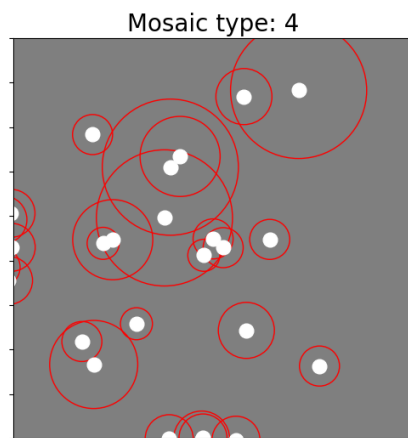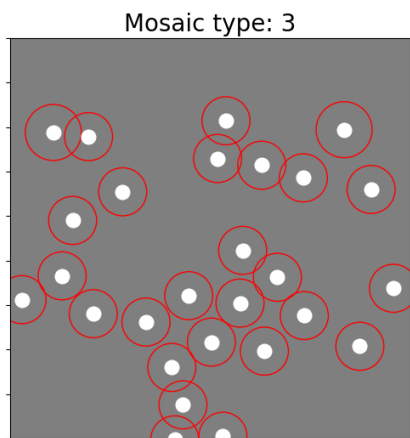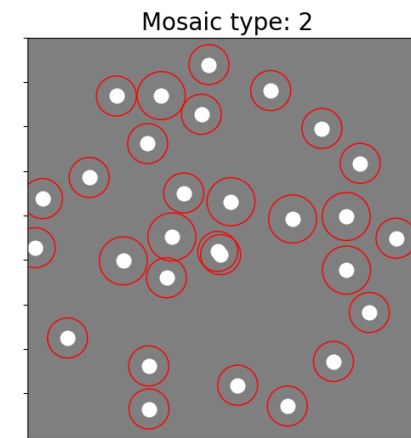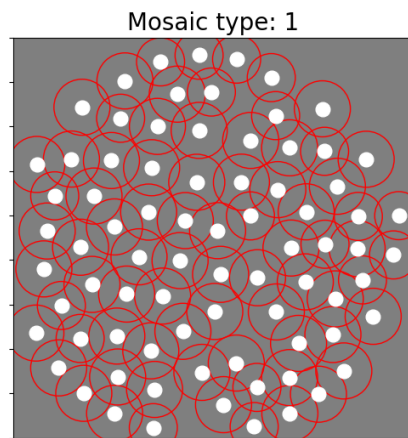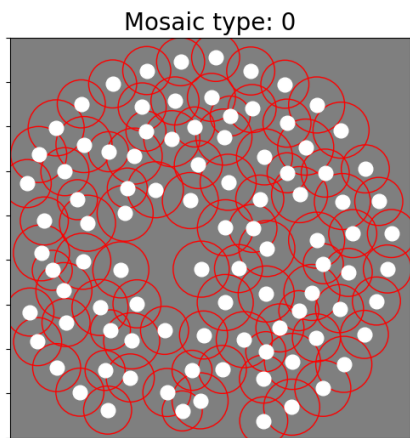
2. Fixed an important bug: Parameters were not initialized randomly

3. Experiment with 3 channels being M cones

Failure mode: Not all neurons converge to ON or OFF mosaics
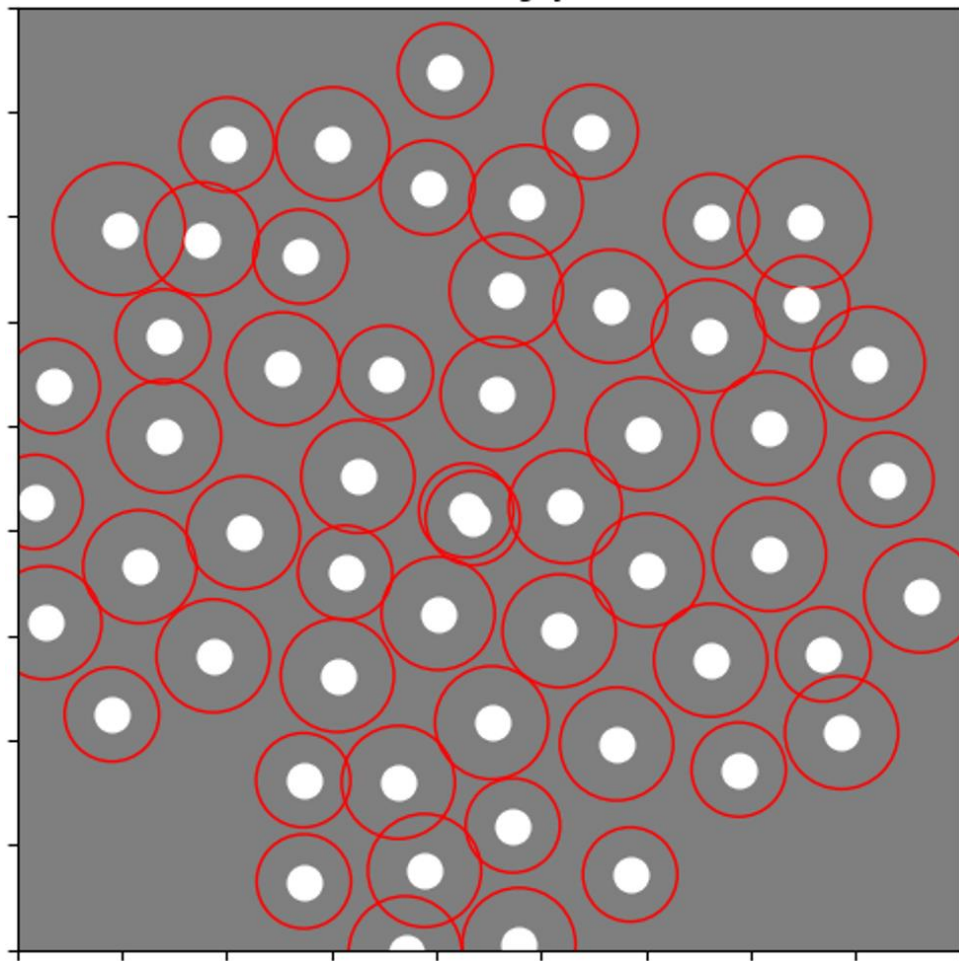
How I determined zero-crossings

Mosaics 2 and 3 "complement" each other
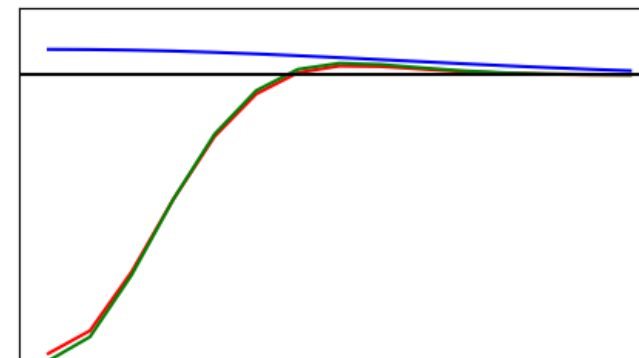
Mosaic 2: OFF midget
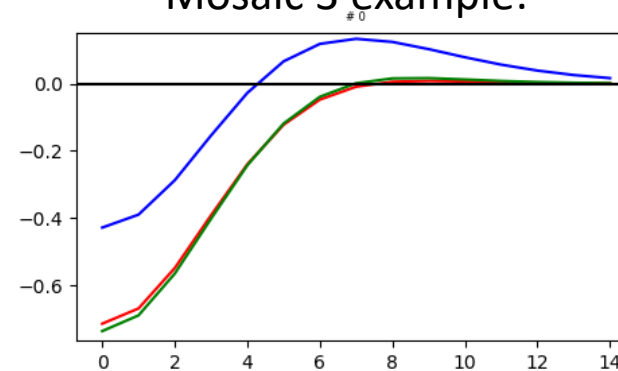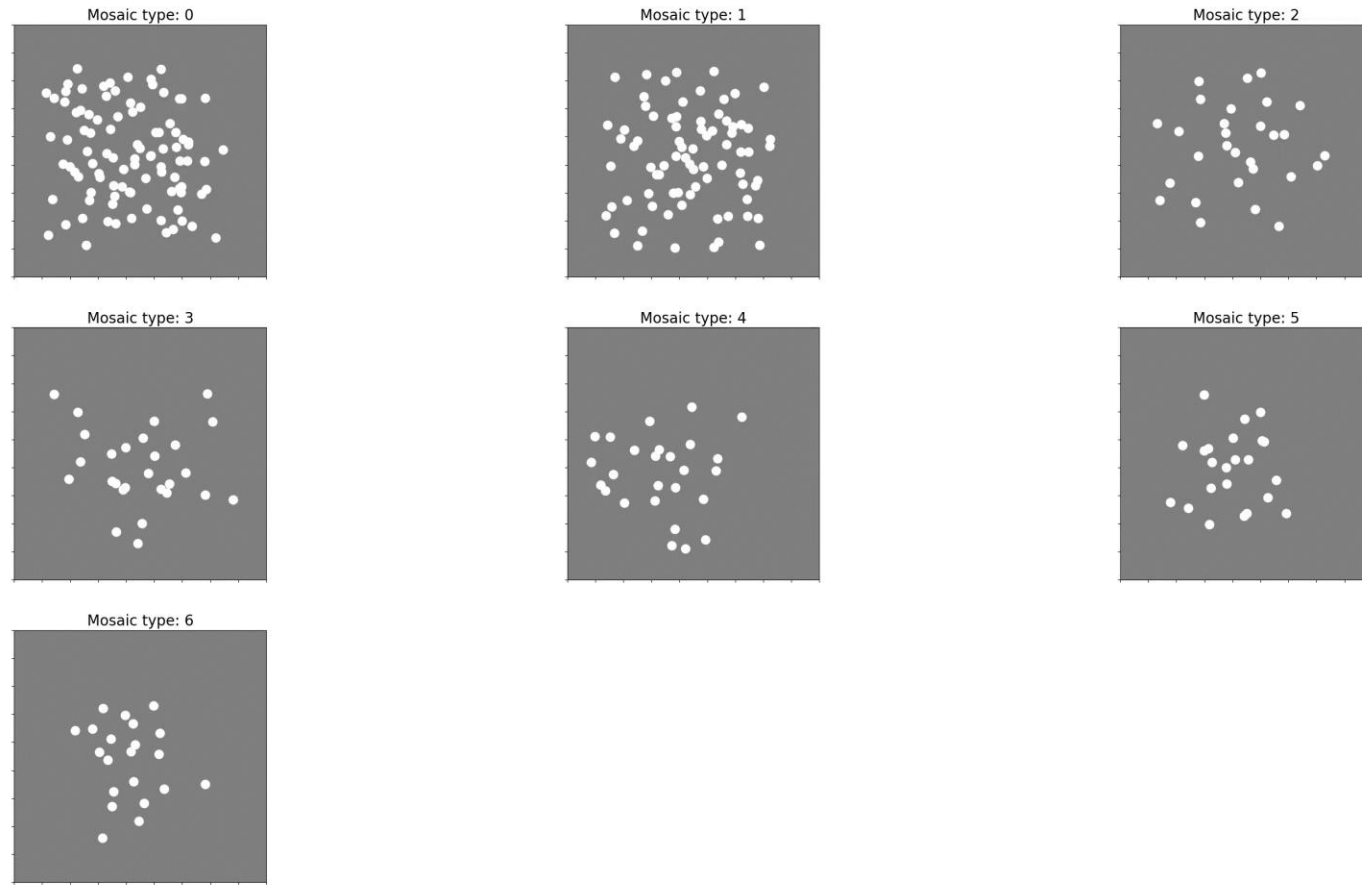Mosaic 3: OFF midget + OFF S inputs

240125-183448

Mosaic 2 + Mosaic 3

Mosaic 2 example:

Mosaic 3 example:

Video: 300 neurons 18x18x3

Mosaic type: 0

Mosaic type: 1

Mosaic type: 2

Mosaic type: 3

Mosaic type: 4

Mosaic type: 5

Mosaic type: 6

Fixing bugs

What I thought I was doing:

Sampling the initial parameters for each neuron from a normal distribution with means (-3, -3, 0, 0) and standard deviation of 1.

What I was actually doing:

All parameters but d were initialized to be the same for each neuron.

d was drawn from a normal distribution with mean = 0 and std = 1.

What I'm doing now

Sampling initial parameters from each neuron from a normal distribution with means that correspond to the converged parameter values and std = 1.

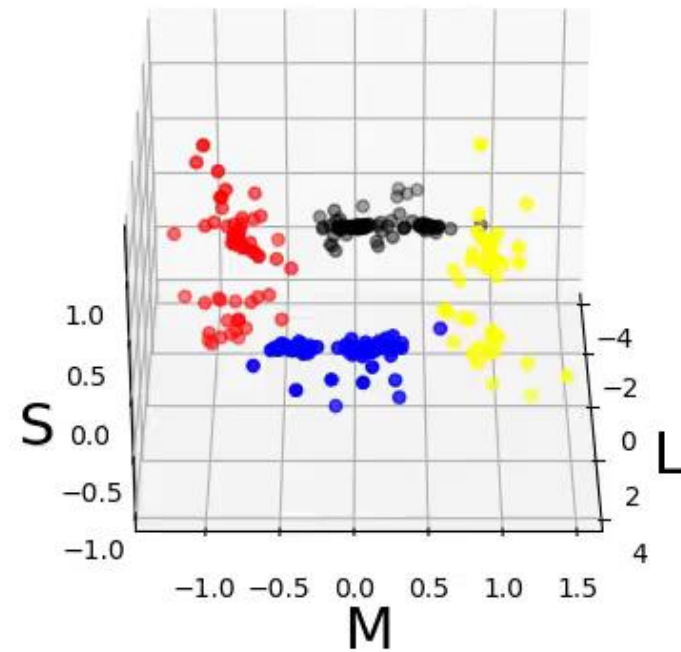***Unfortunately, that didn't fix the mosaics***

Experiment

- All 3 colors channels are the same: M inputs.

- kernels are 18x18x3

- DoG parametrization

- 2M epochs

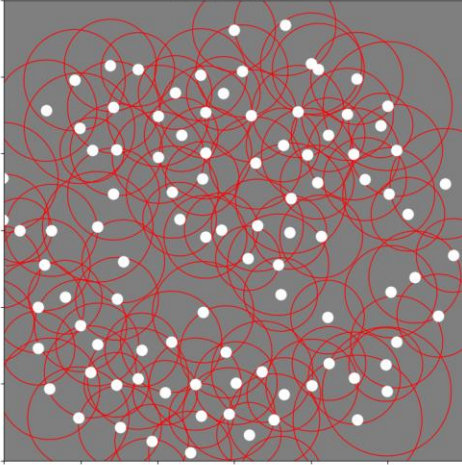What you would expect: All neurons fall within ON and OFF mosaics

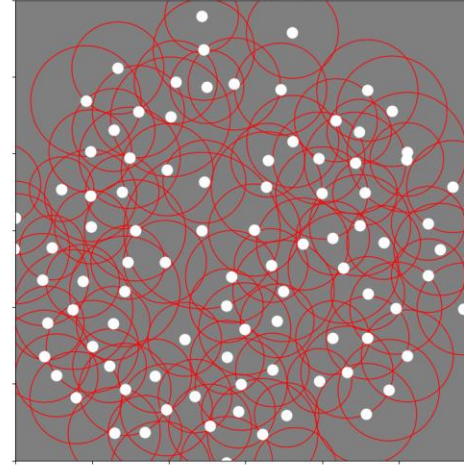Name for future reference: 240212-143644

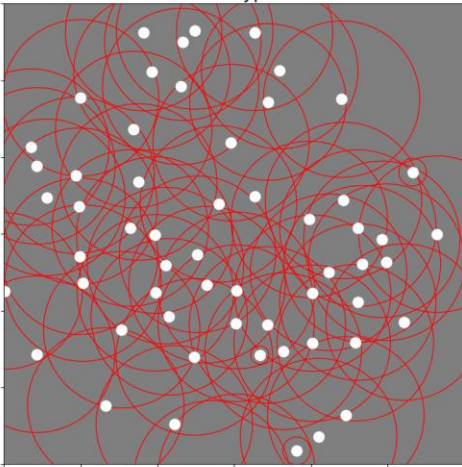# PCA of radial averages

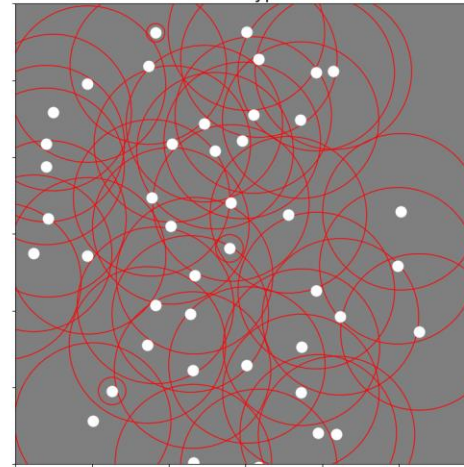# Mosaics of each cluster
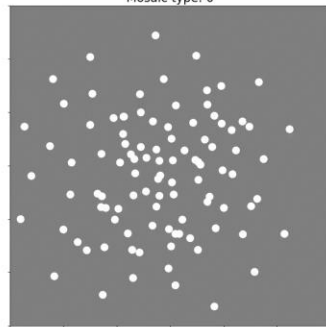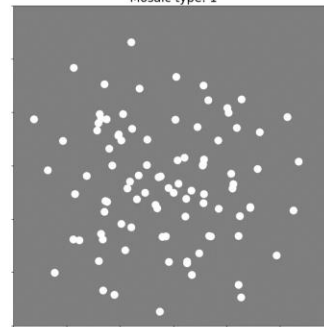

Mosaic type: 0

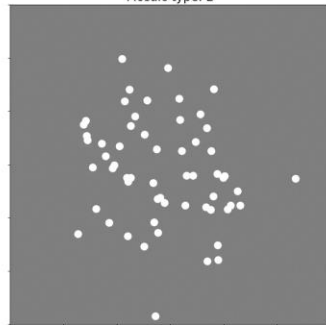Mosaic type: 1

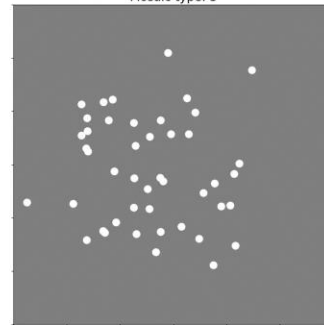Mosaic type: 2

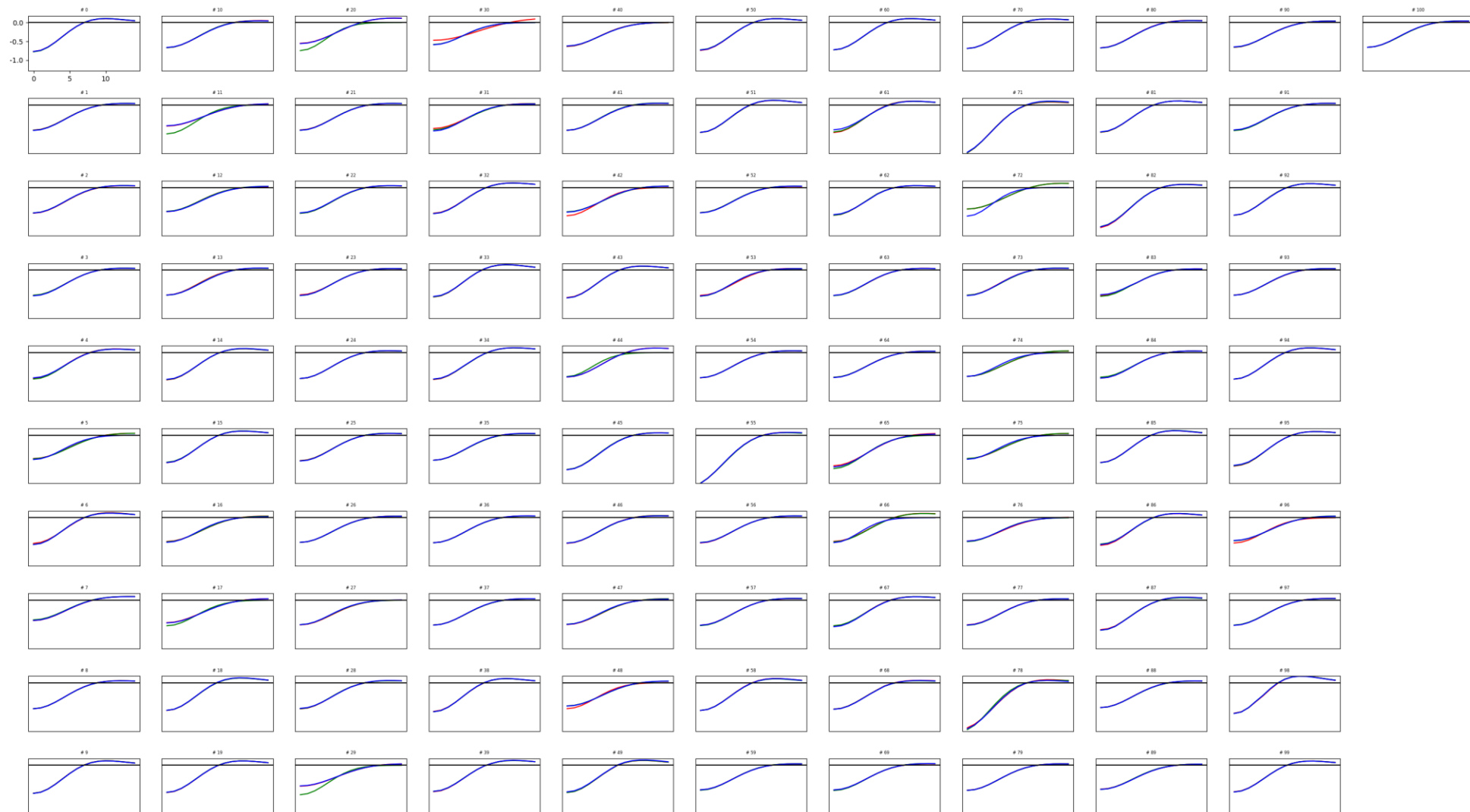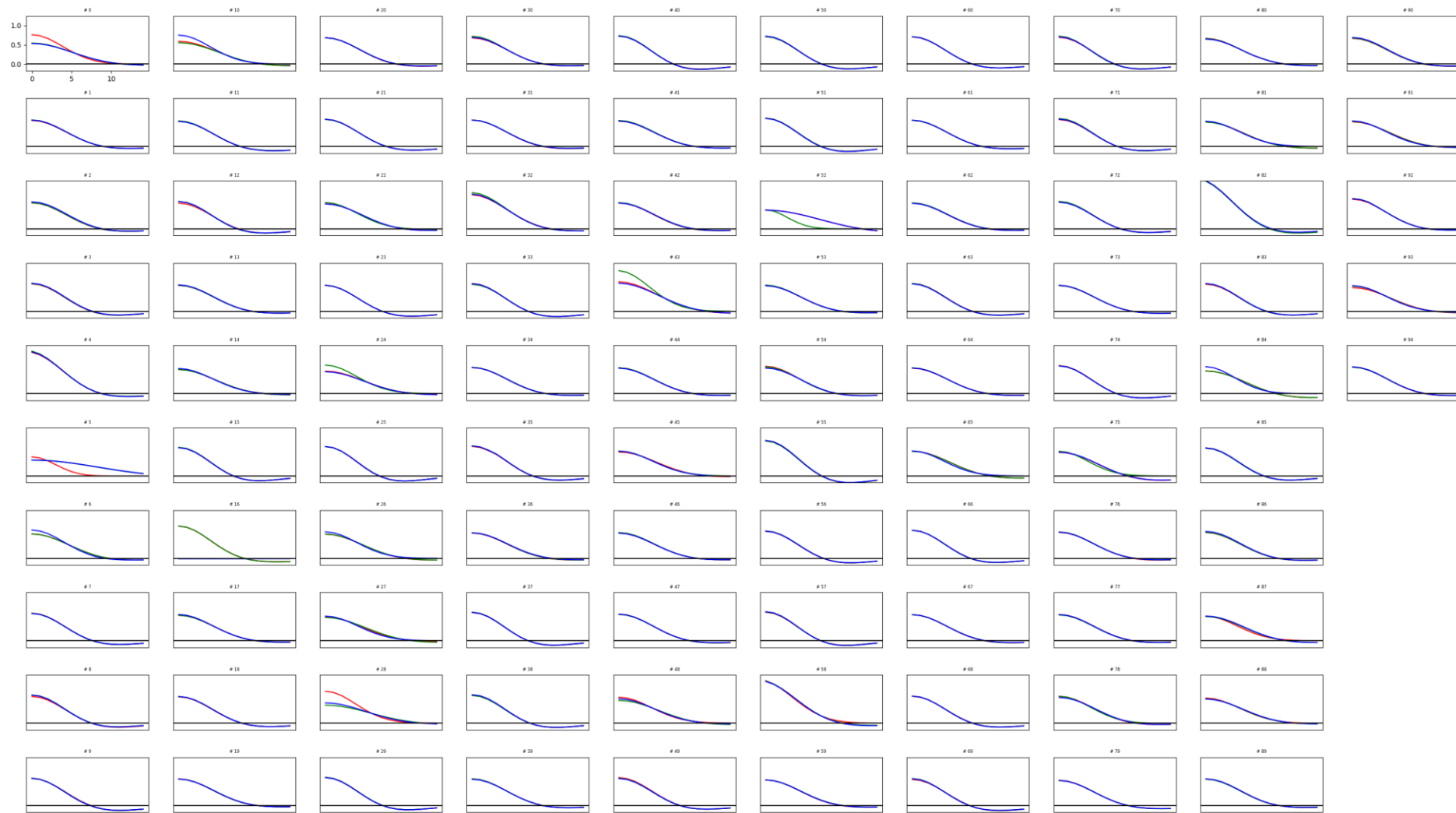Mosaic type: 3

Video version

Mosaic type: 0

Mosaic type: 1

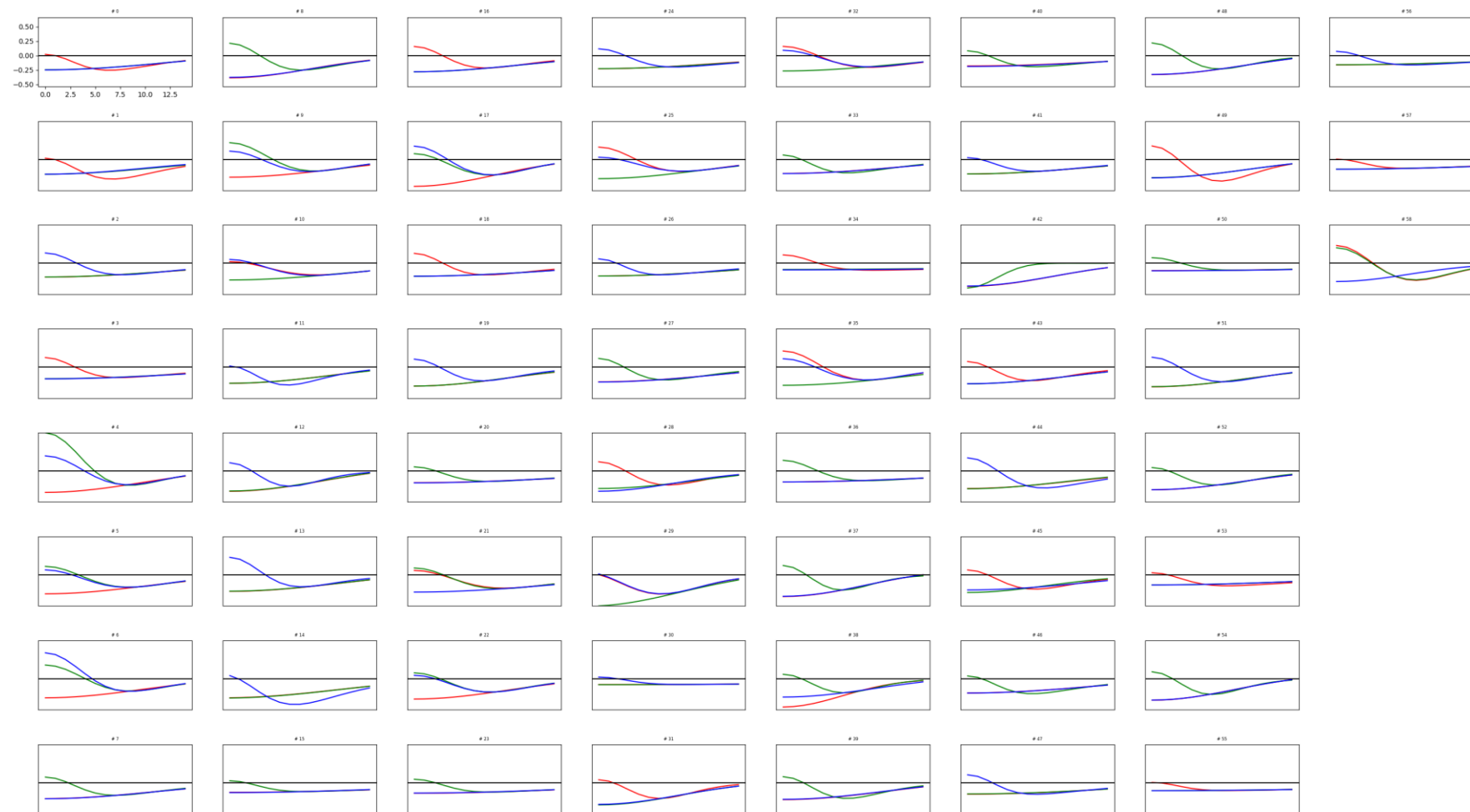Mosaic type: 2

Mosaic type: 3

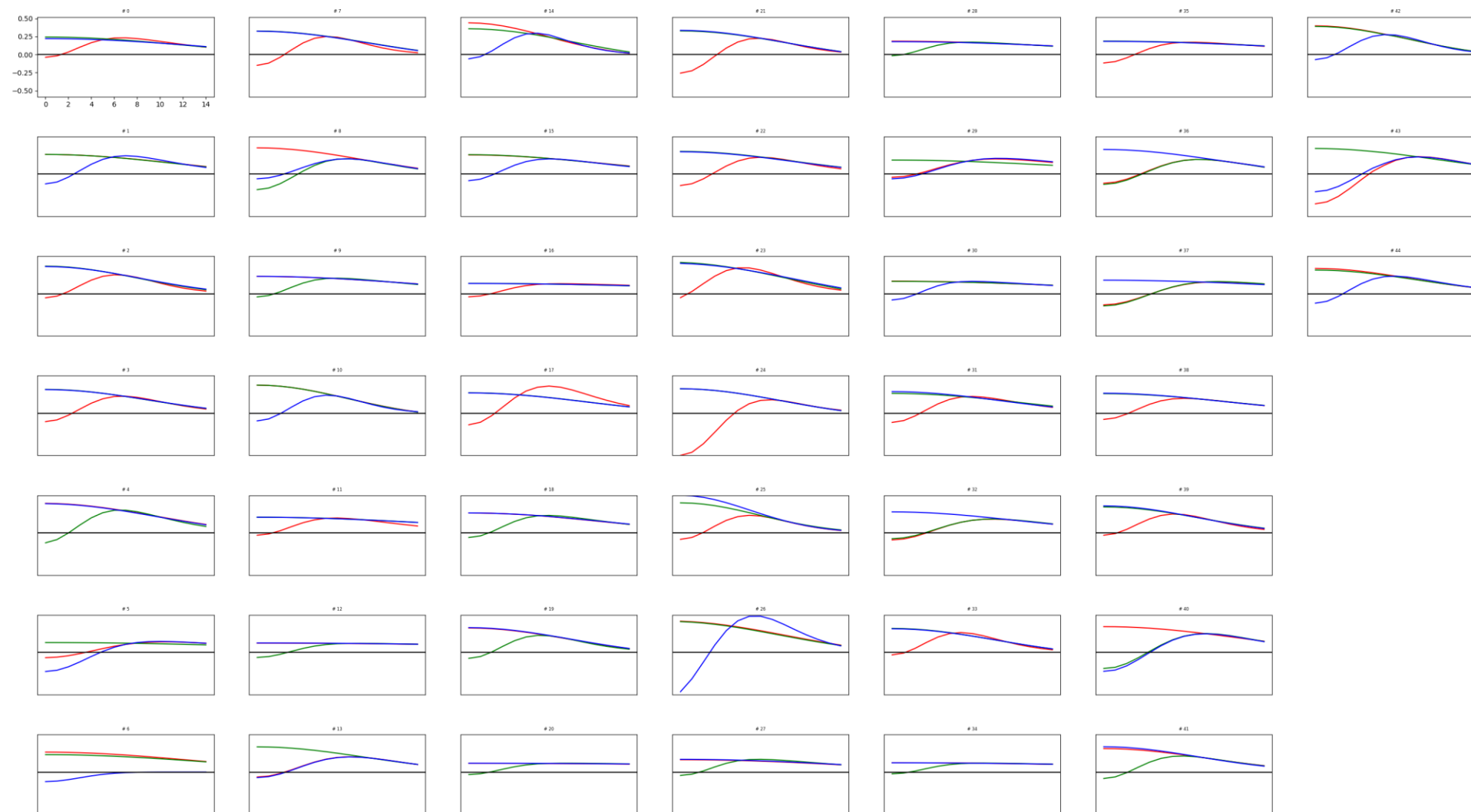# First cluster

Second cluster

Radial distance from center (pixels)

Third cluster

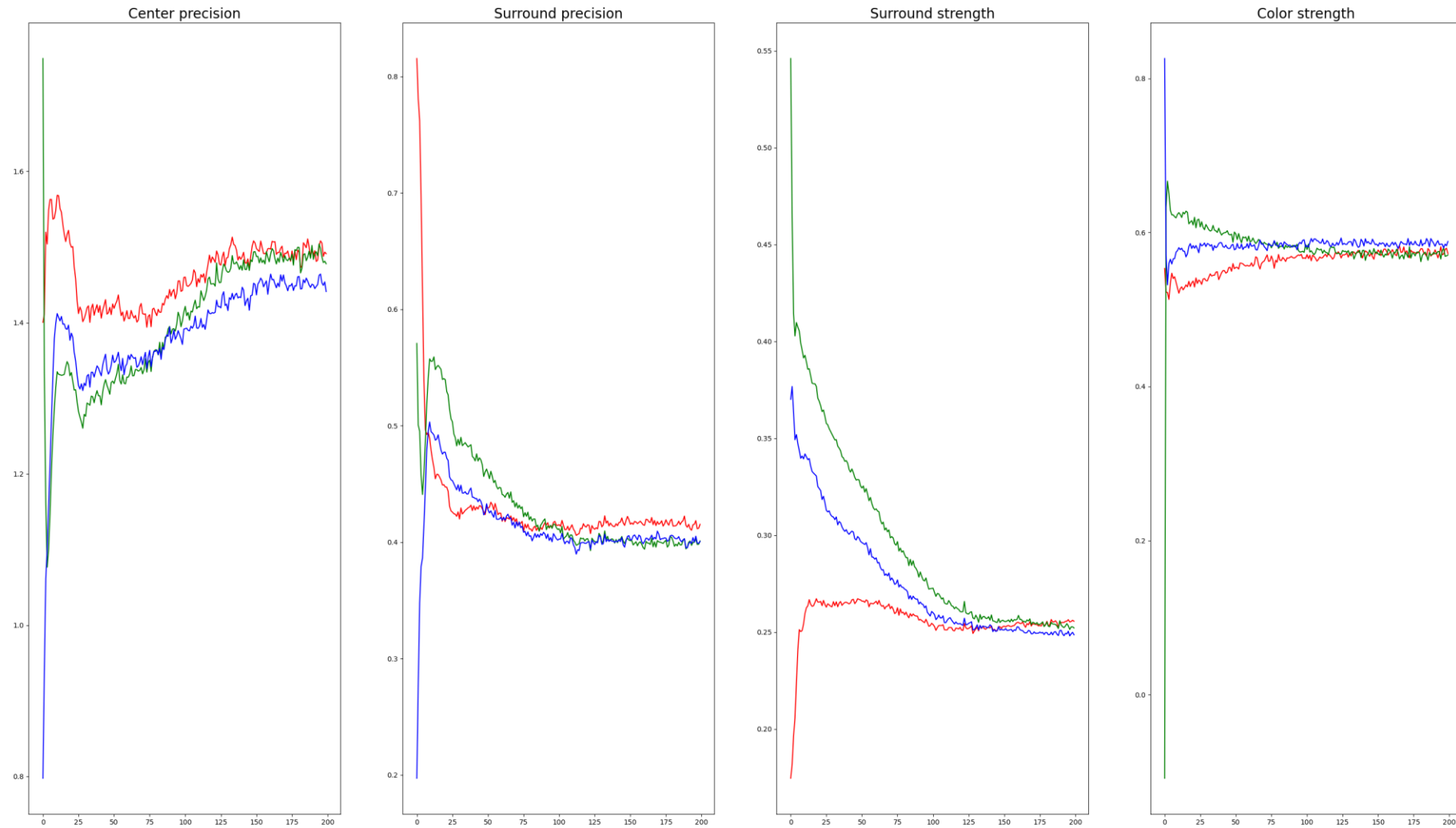Radial distance from center (pixels)

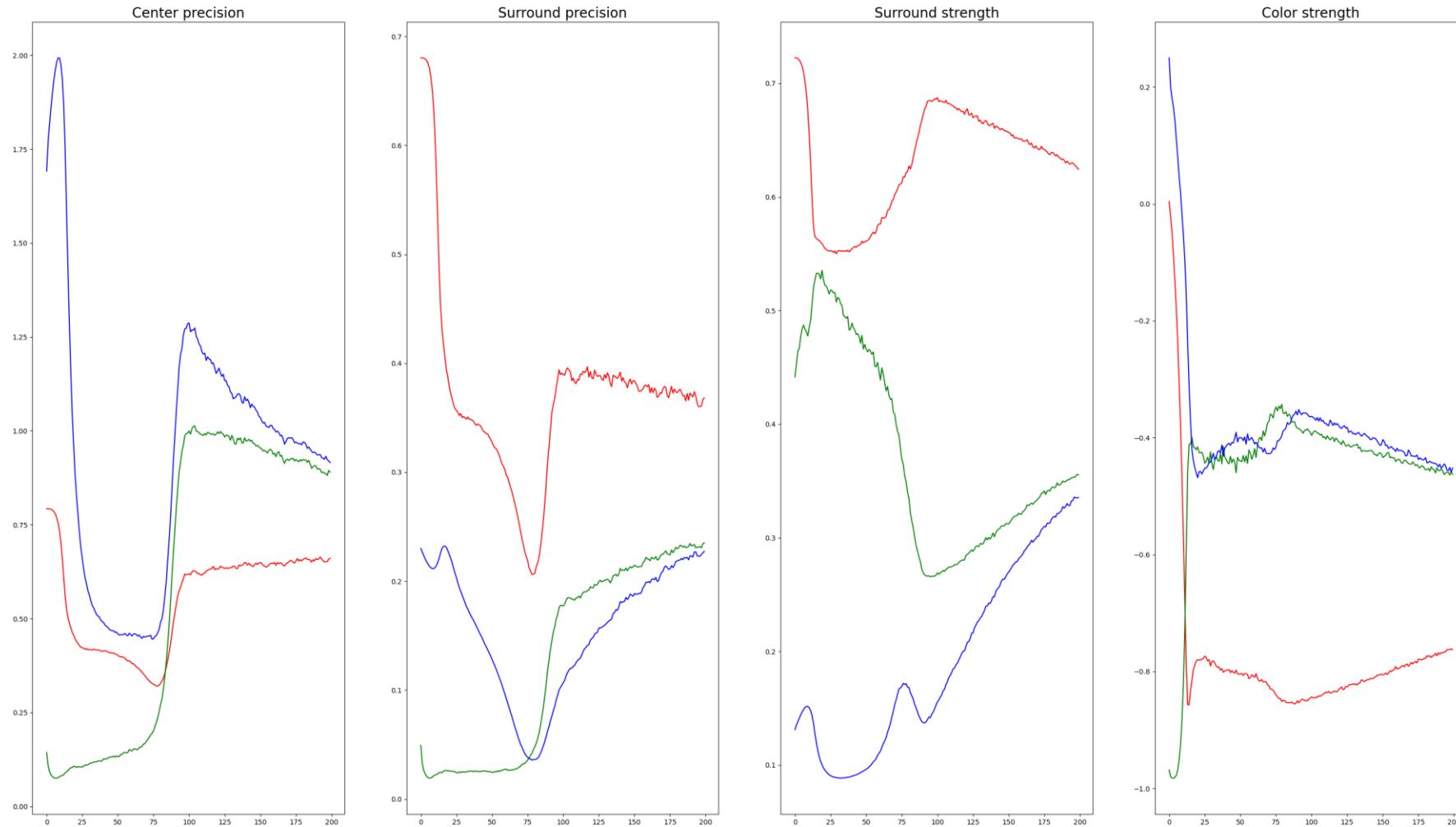# Fourth cluster

Radial distance from center (pixels)

Parameters over time of a "good" neuron
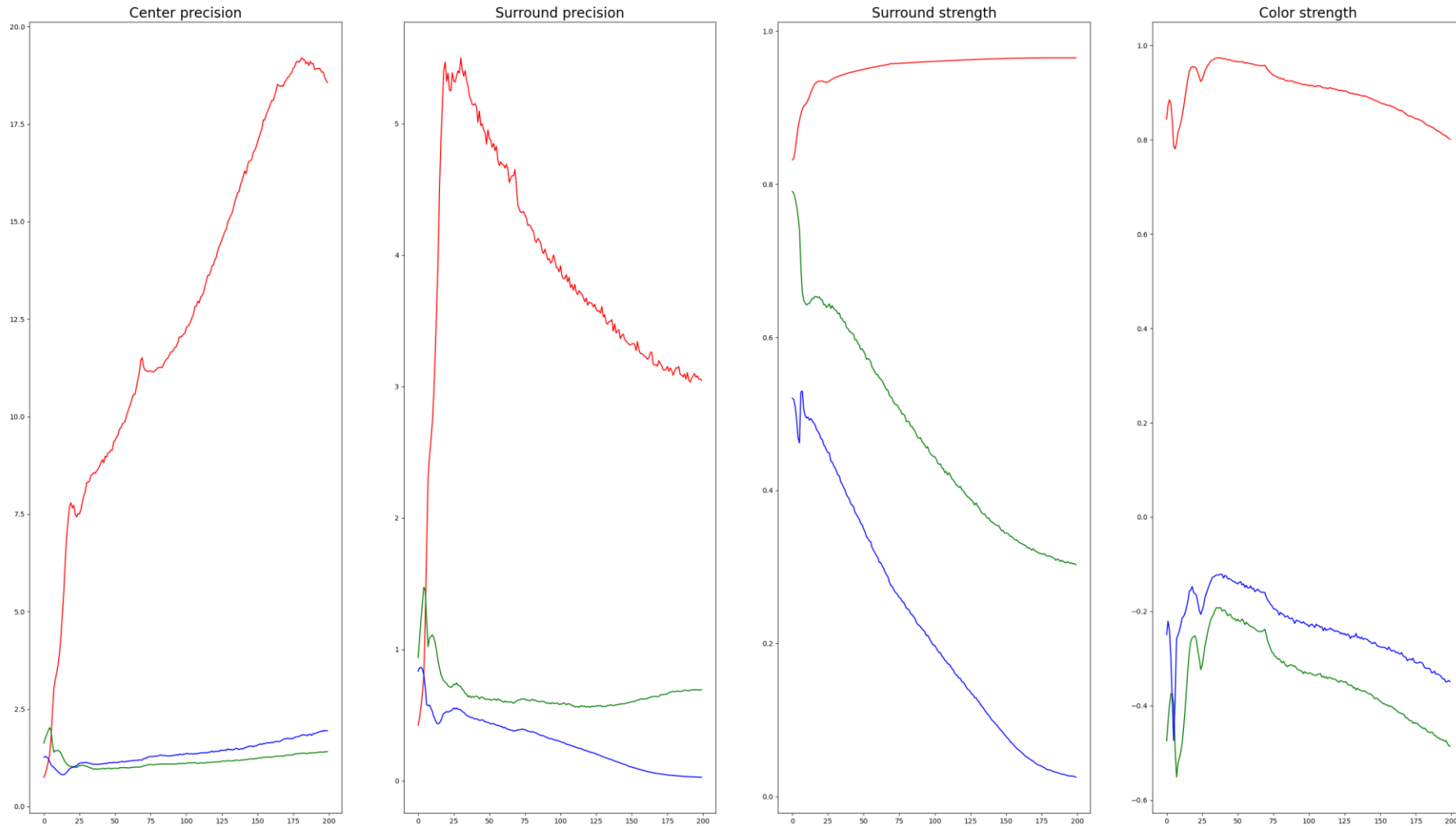
Neuron # 12, type: 1

Some neurons haven't converged but look good

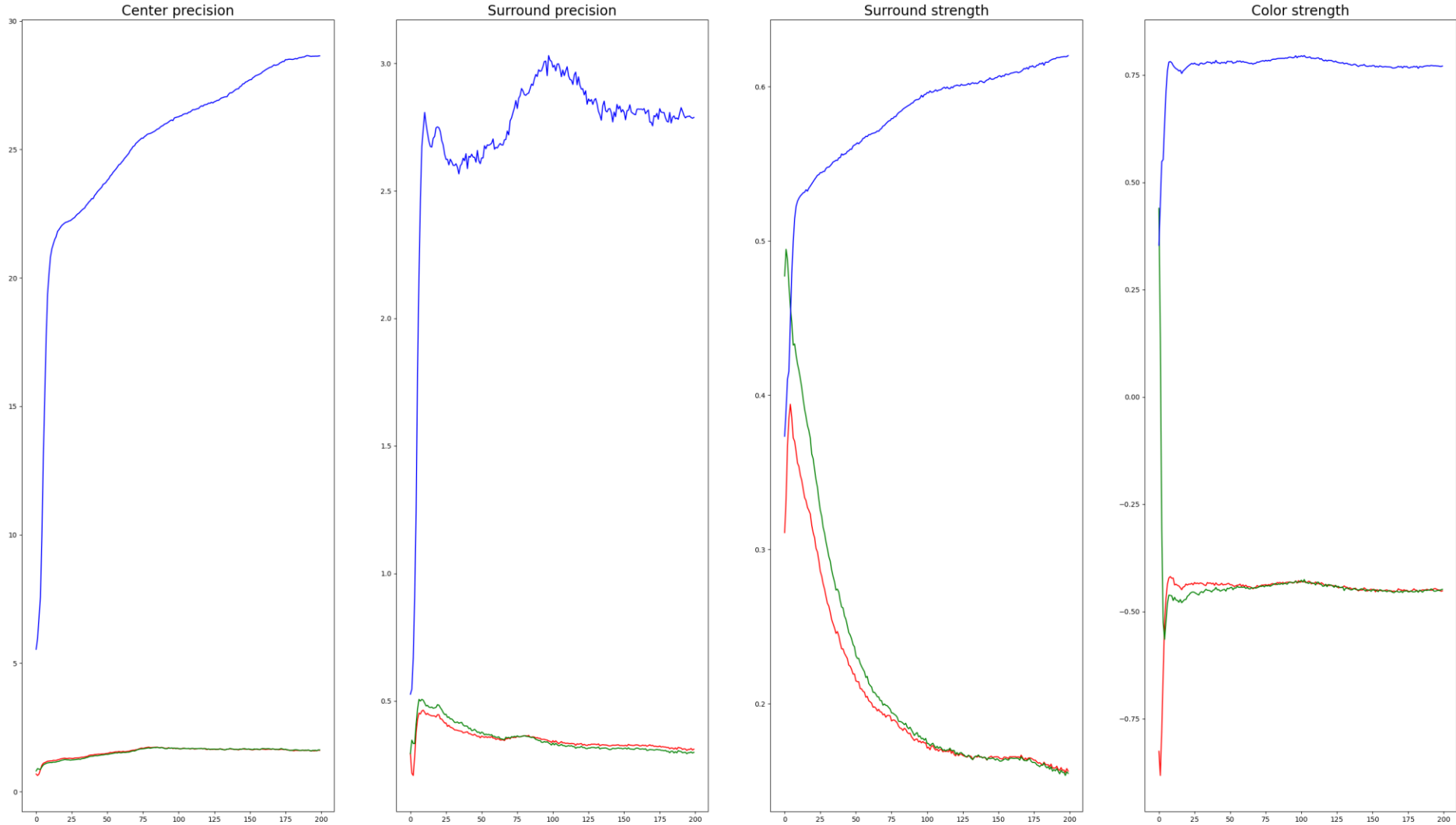

Neuron # 14, type: 0

In bad neurons, the center precision goes up indefinitely

Neuron # 10, type: 2

Neuron # 11, type: 2

Memory limit

What **does** influences the limit:

Number of neurons, batch size

What **doesn't** influence the limit:

Kernel size, number of channels

Why is that?

It would be possible to run 1000 neurons with a batch size of 16.

For 3M epochs, it would take ~55 hours.