

Gratings Vs Reality : How We Strip Down the Visual World



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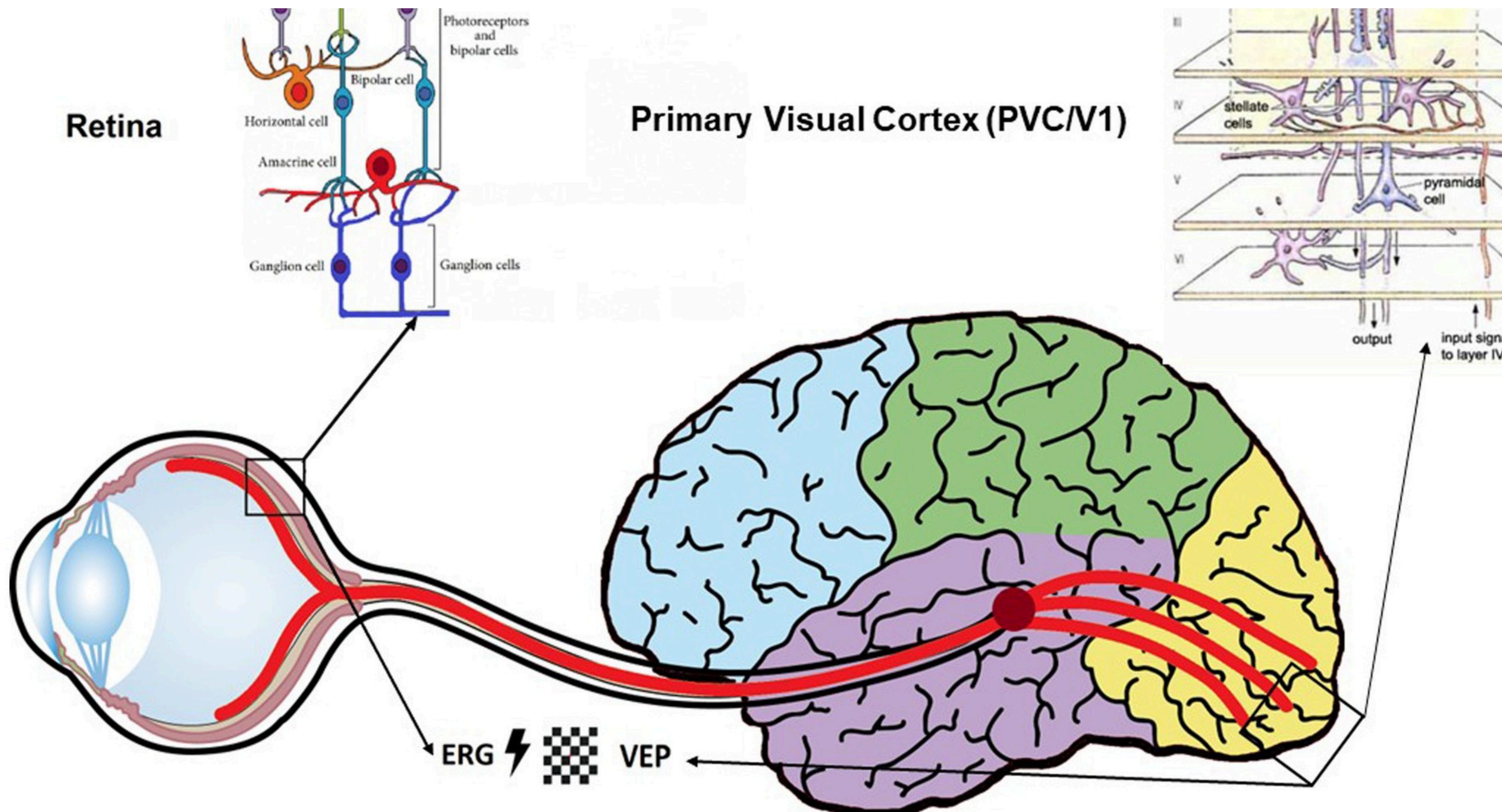
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Dr. Ash Parker
Dr Zouinkhi Marwan

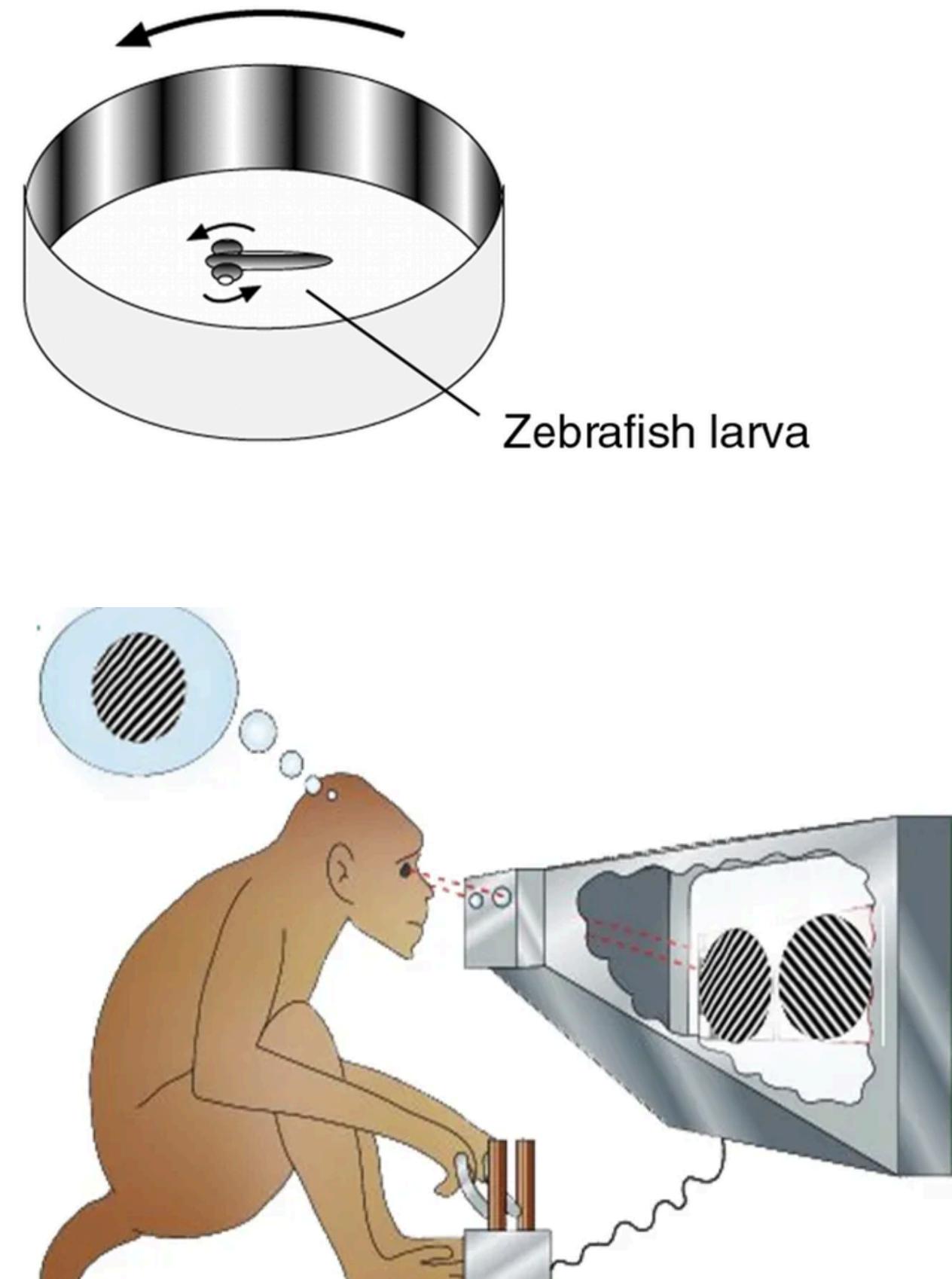
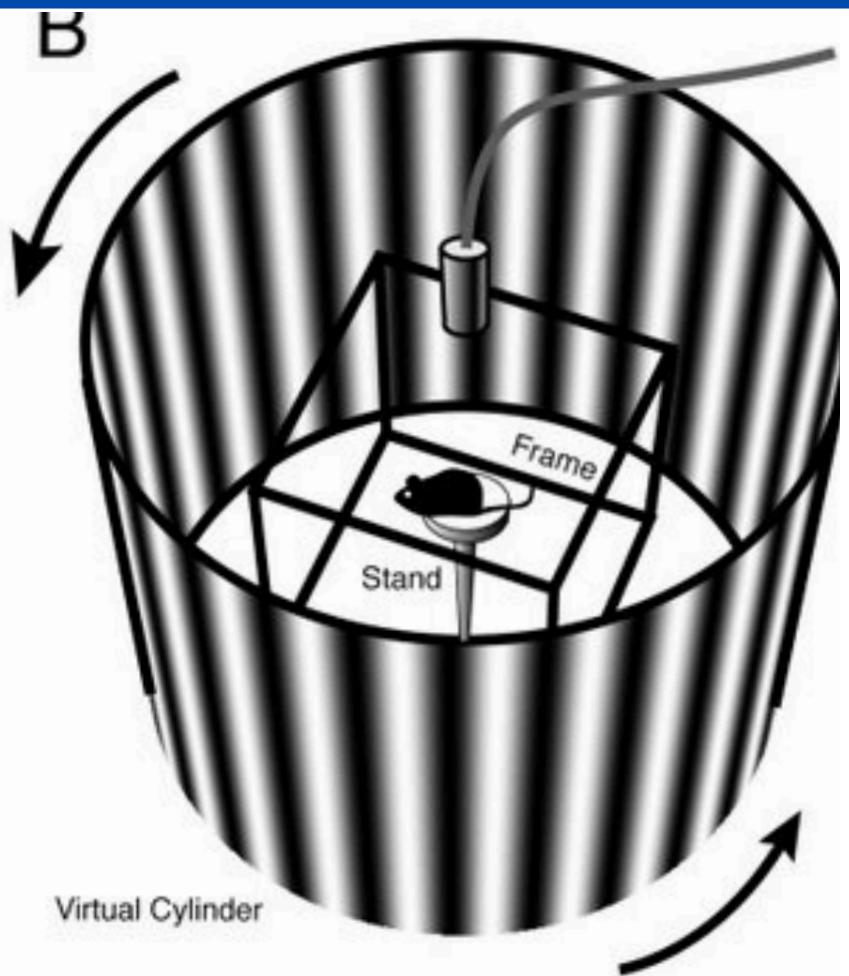
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Introduction





Why it Matters ?



How do neurons respond to visual stimuli?

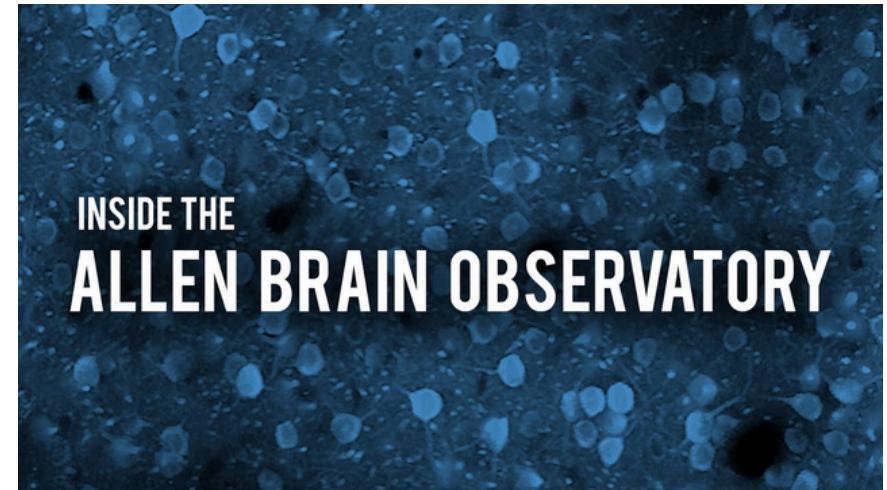


Do the same neurons respond similarly to different stimuli?

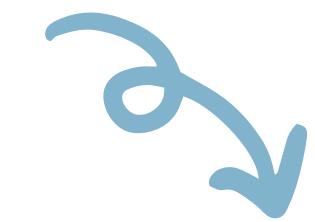


How could we measure this?

Exploratory data analysis



Area : VISp



Cre_Line: EMXR

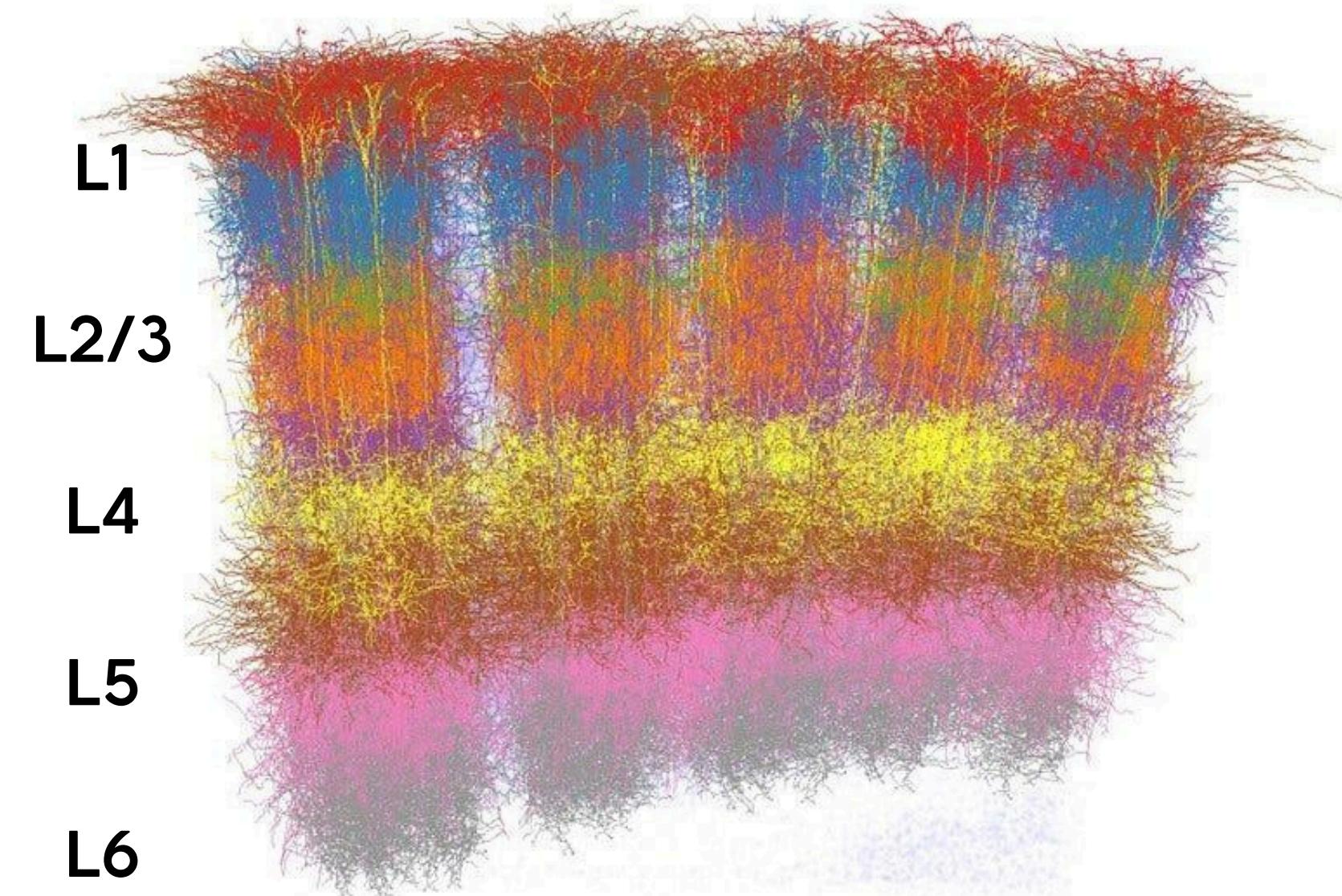


Layers: L4

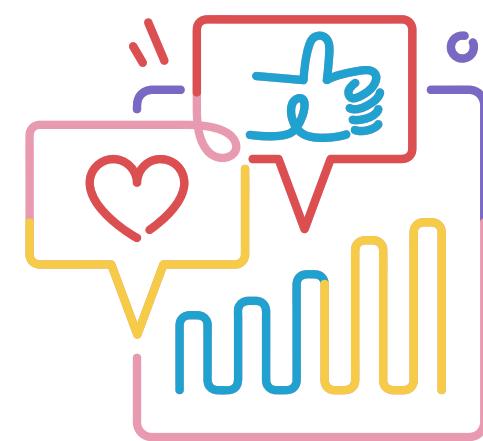


Static gratings

Natural
sciences



Approach



Tuning Curve

Calculated Tuning curve of all the neurons in both Stimuli



Matrix Correlation

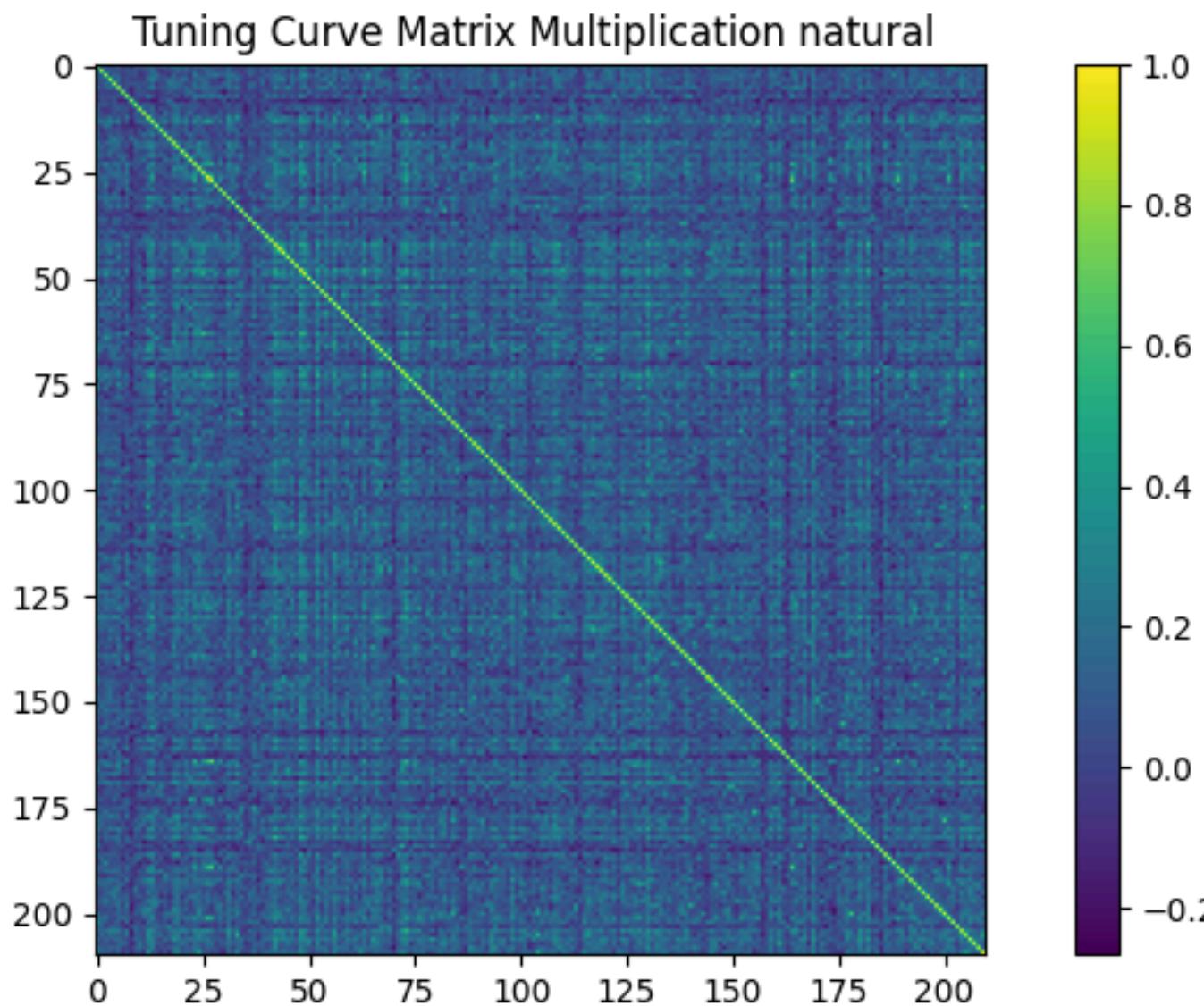
Performed correlation matrix of static gratings and natural stimuli on the same neurons



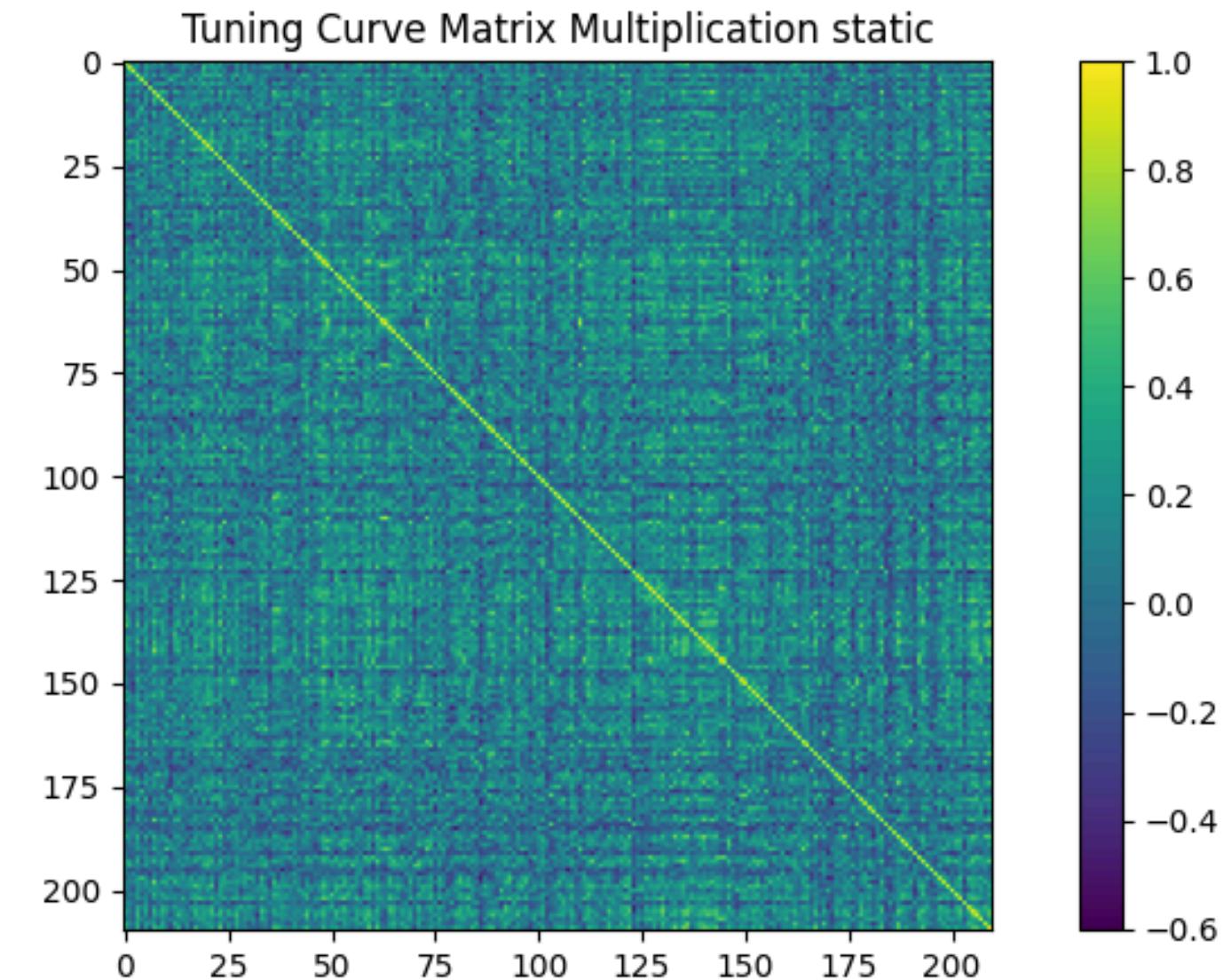
PCA

Performed dimension reduction for both static gratings and natural stimuli

Pairwise Correlations

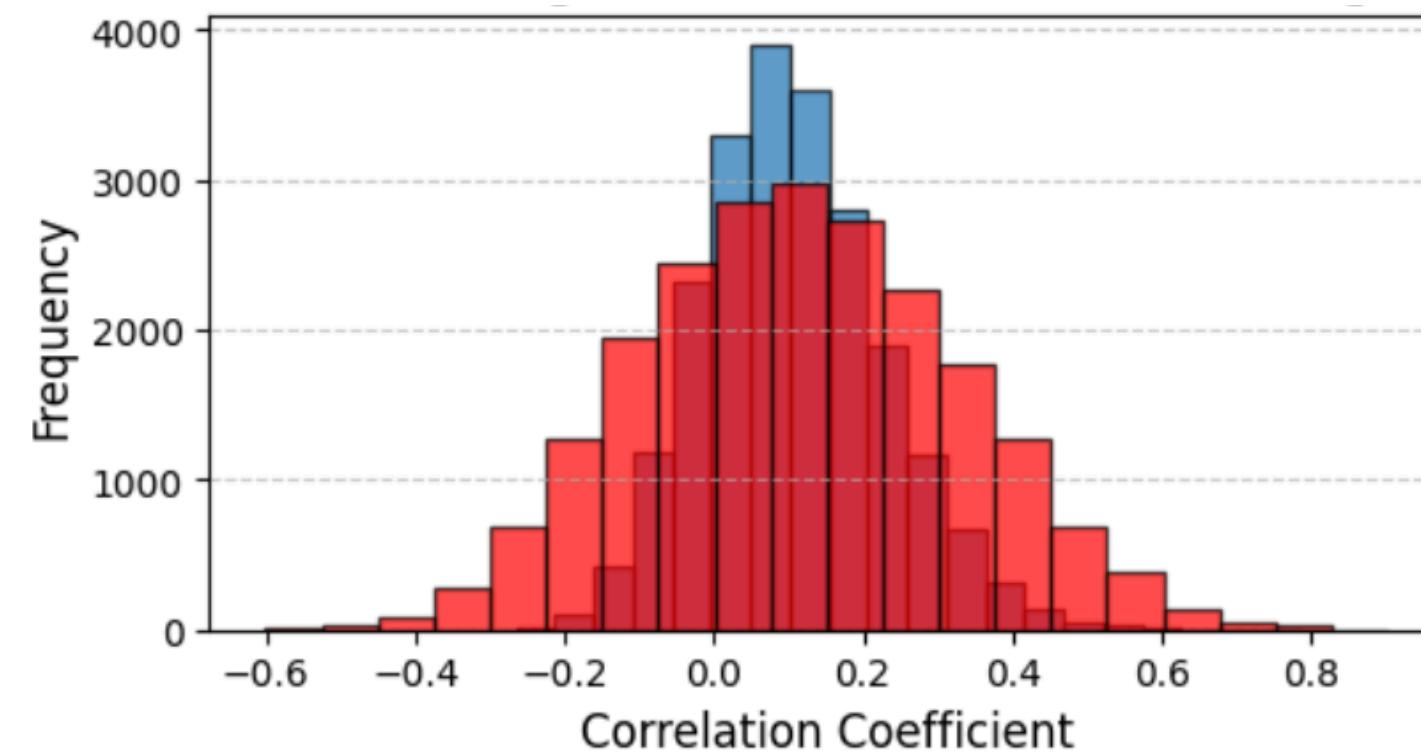


Natural scenes

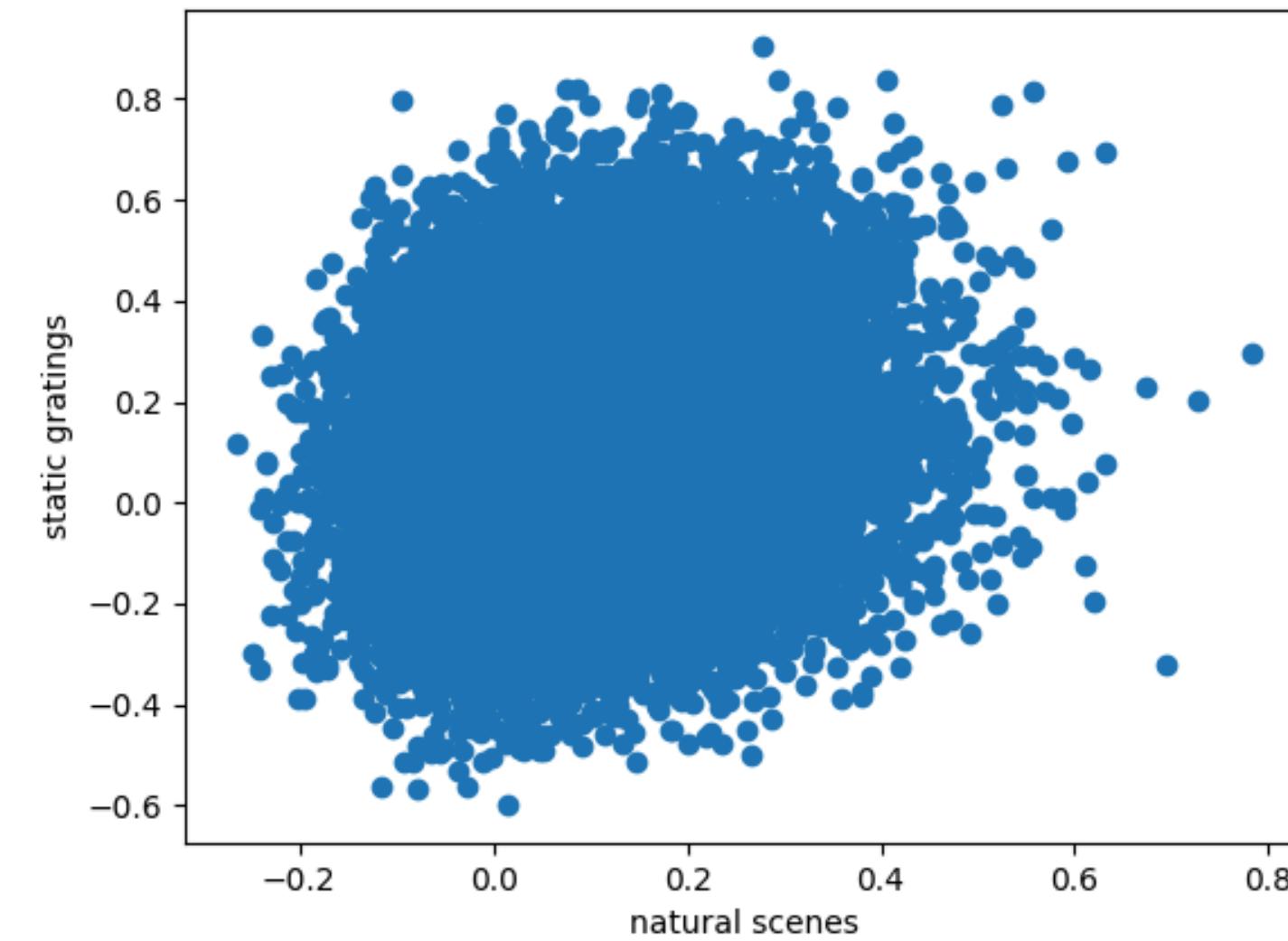


Static gratings

Neuron pairs are similarly correlated in simplified stimuli

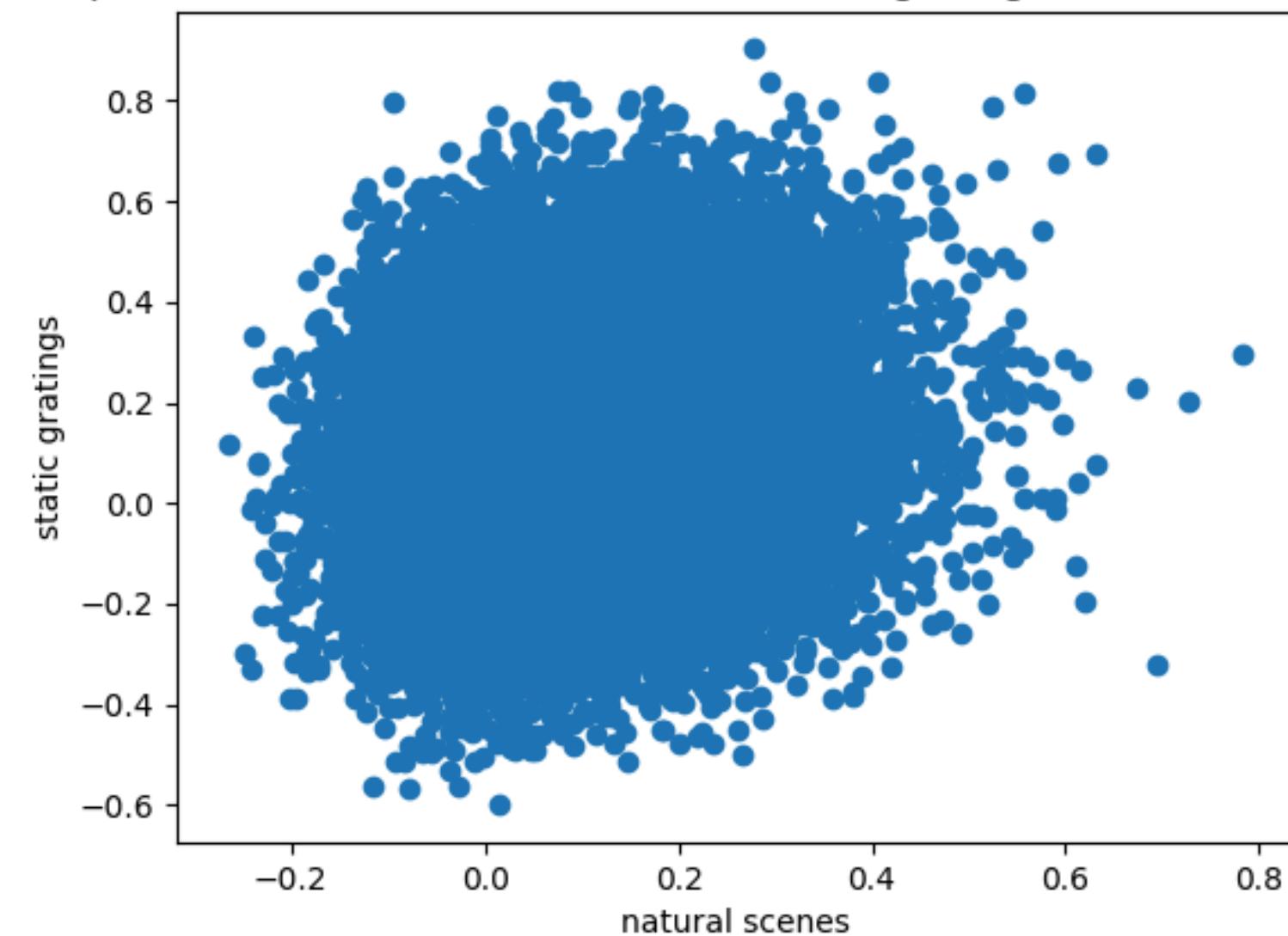


Scatter plot for correlation of correlations of static grating matrix and natural sc

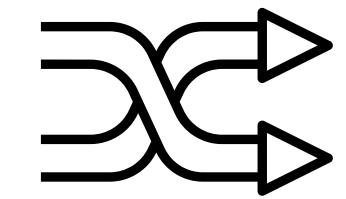


Neuron pairs are similarly correlated in simplified stimuli

Scatter plot for correlation of correlations of static grating matrix and natural sc



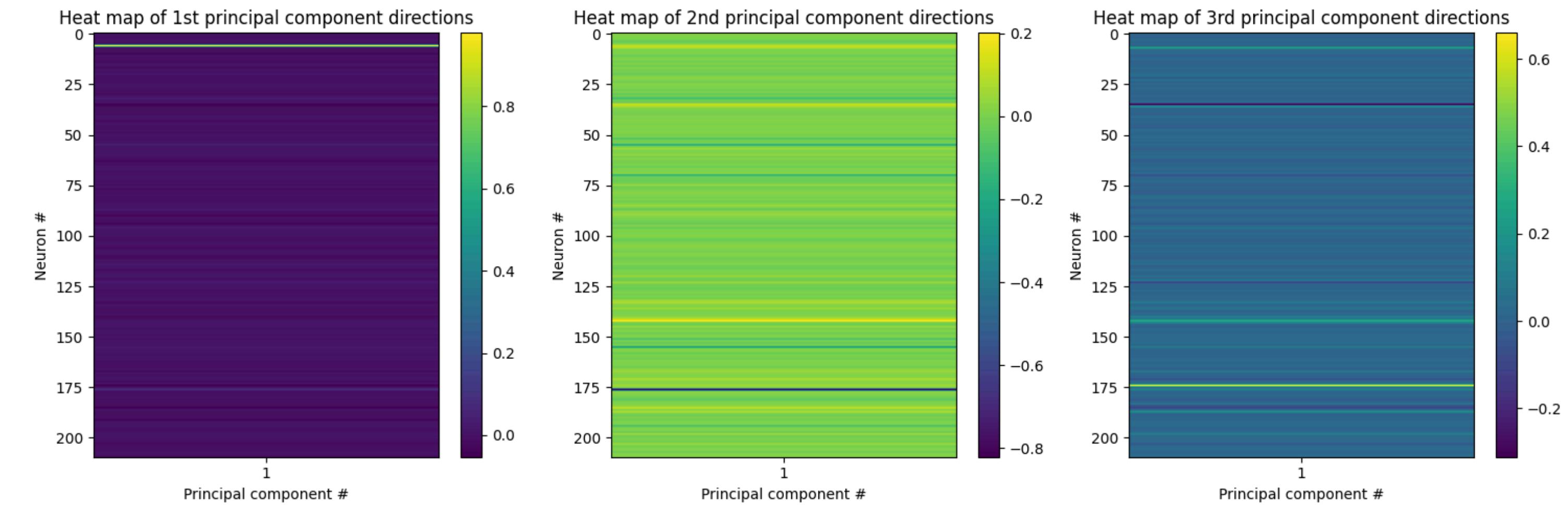
SPEARMANR=0.29
PVALUE< 0.001



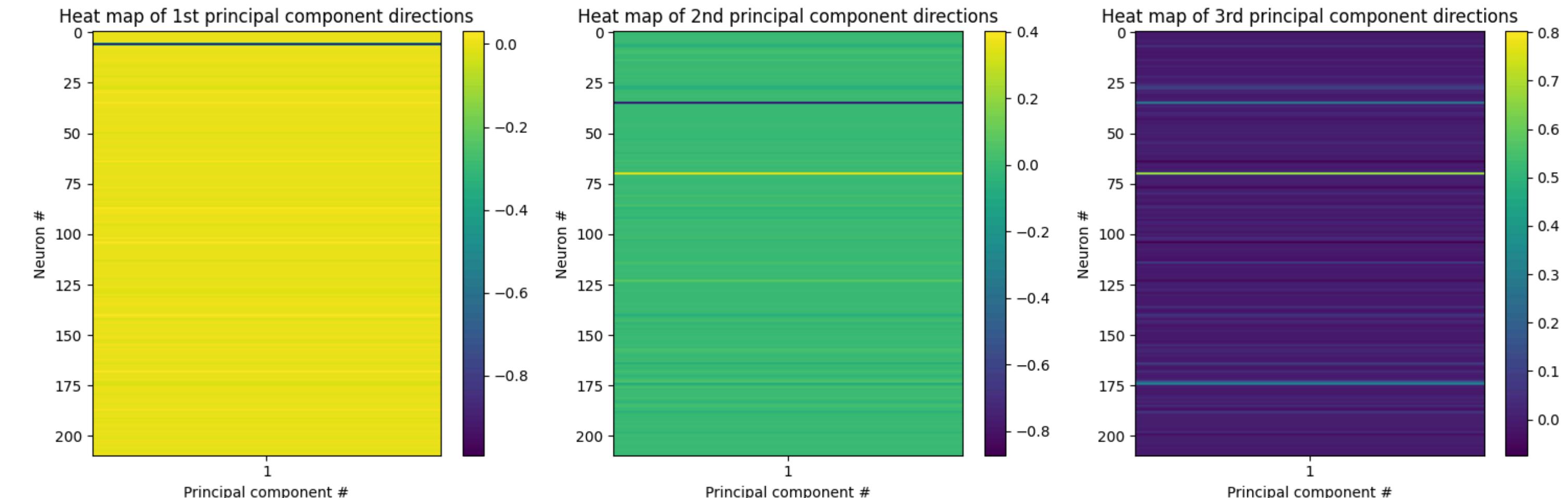
SPEARMANR=0.00785
PVALUE=0.867

Static gratings

PCA



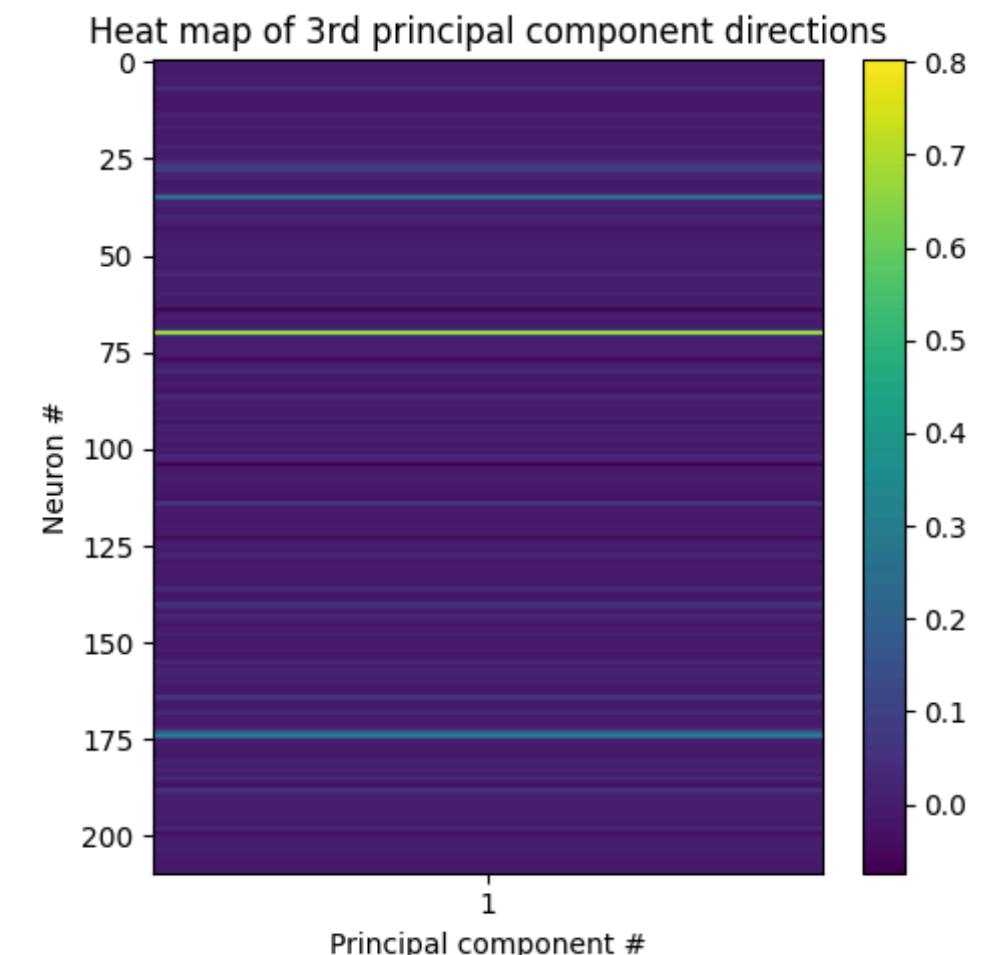
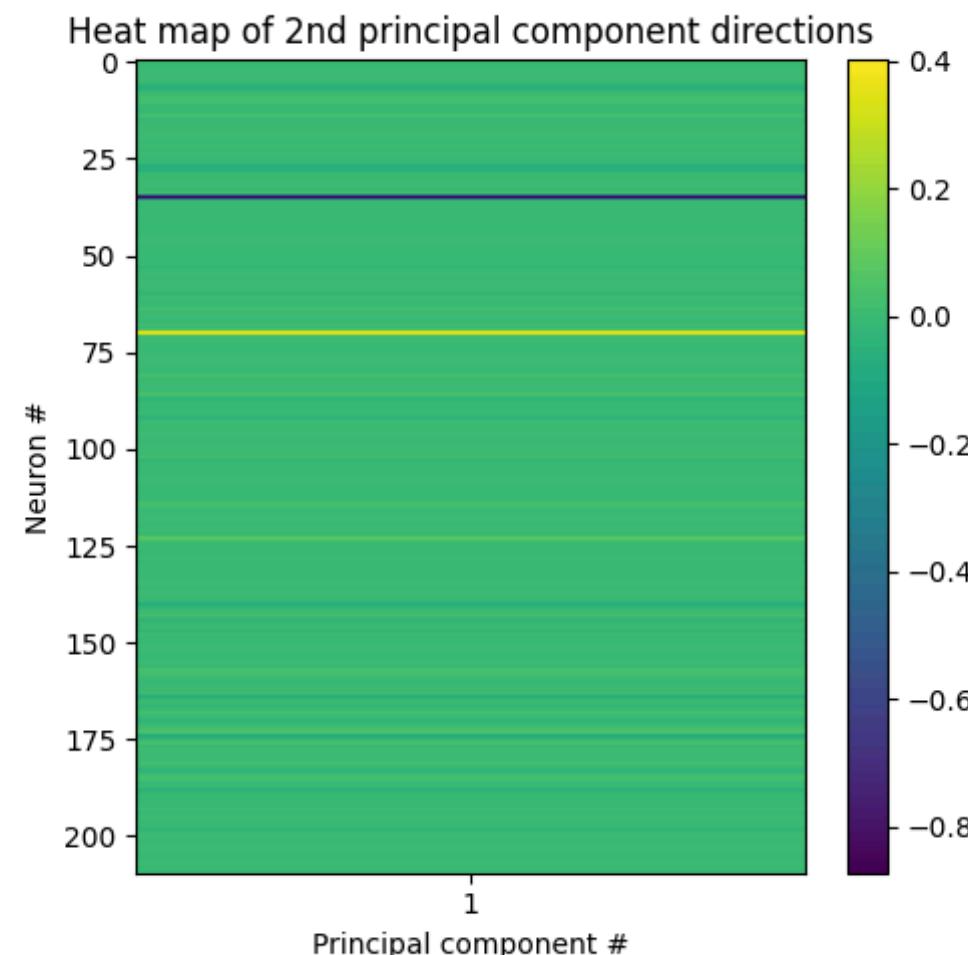
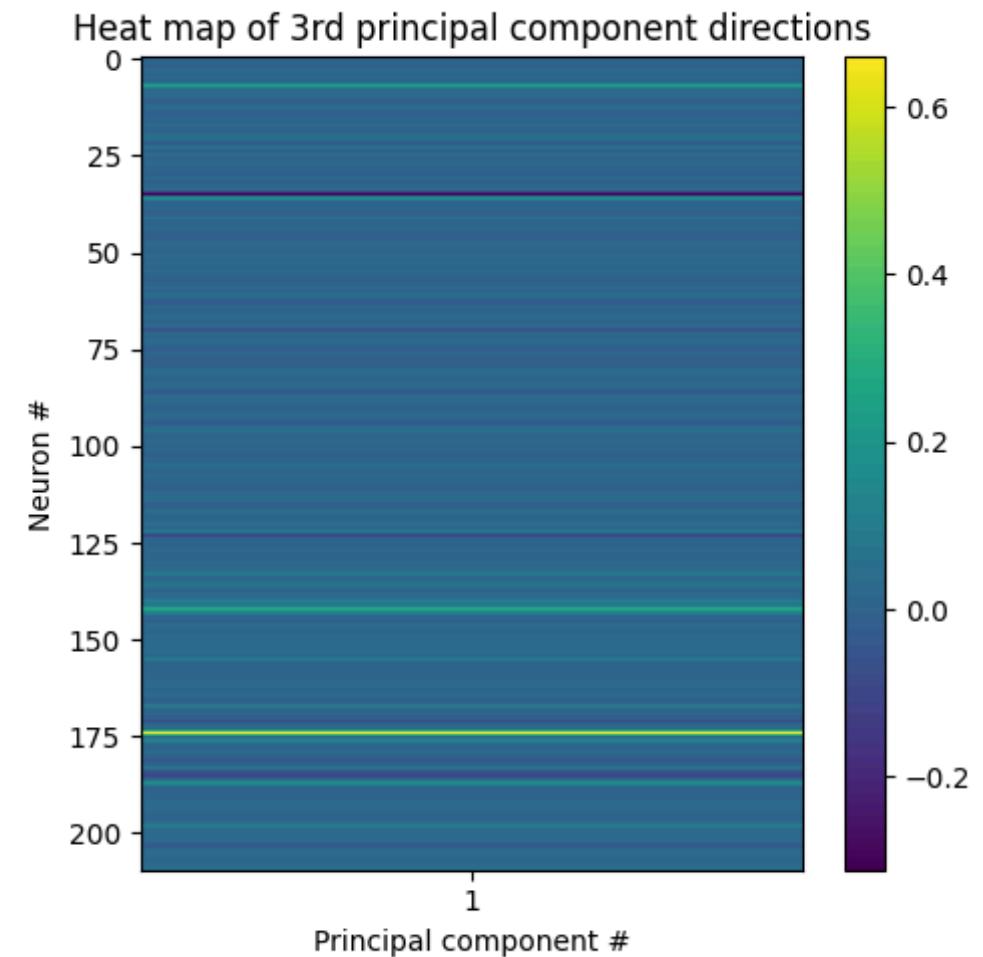
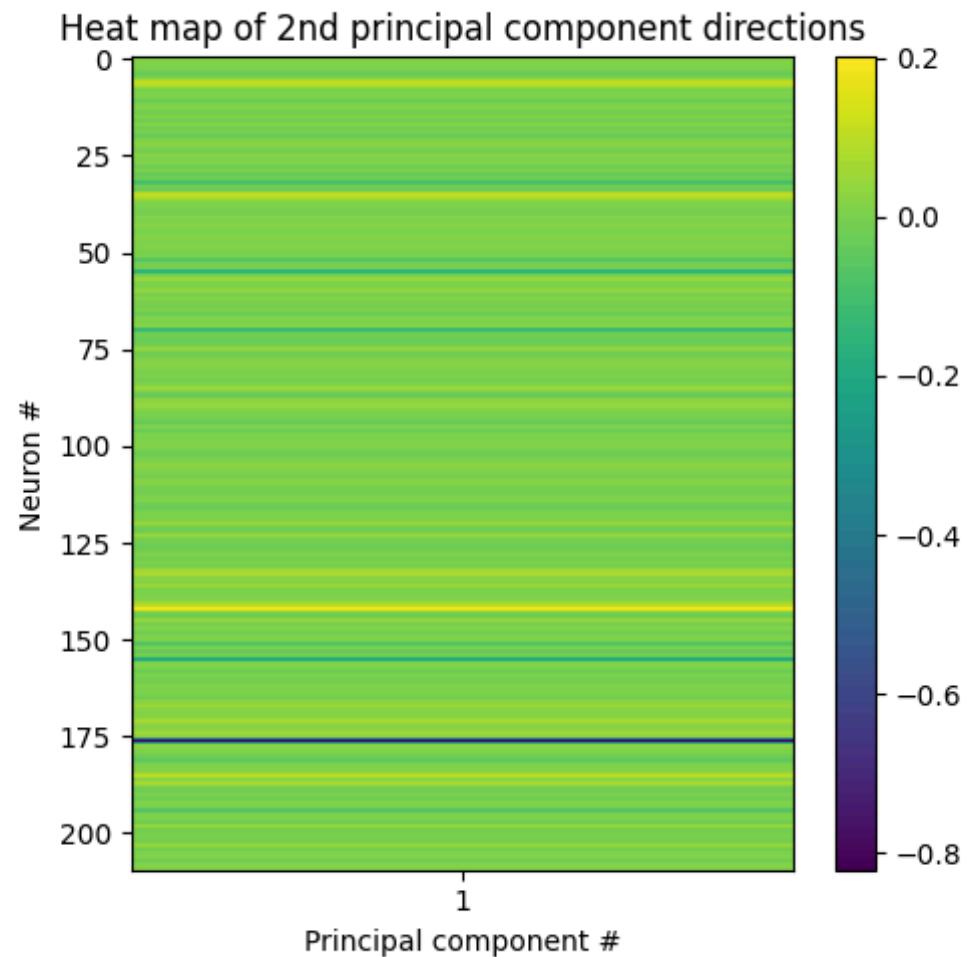
Natural scenes



Neuron 35

Natural scenes

Static gratings



Conclusions

- Effectiveness of Allen Dataset to study visual cortical responses in simplified stimuli vs natural stimuli
- Pairs of neurons are similarly correlated in complex and simplified stimuli
- Some neurons contribute to dominant dimensions of the data in both complex and simplified stimuli