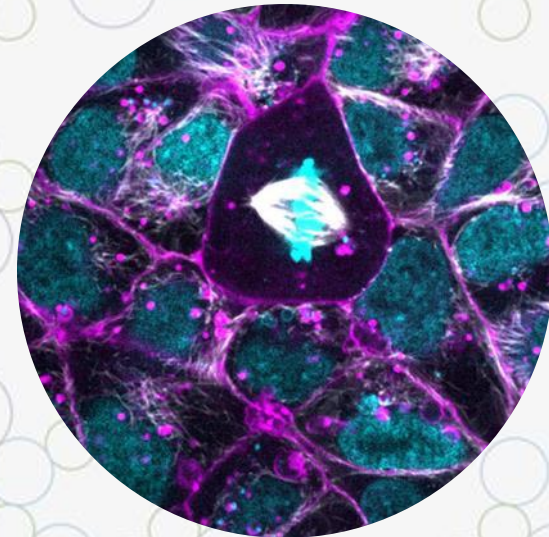




# Visual Behavior Dataset



# Visual Behavior Project

The Visual Behavior project aims to use **large-scale physiology in behaving animals** to characterize how sensation and behavior are encoded in activity across the thalamocortical visual system and how these representations are influenced by **behavior state, expectation, and experience** during an image change detection task.

Transgenic Mice



Surgery



ISI Mapping



Behavior Training



In Vivo 2P Imaging



Perfusion



2P Serial Tomography



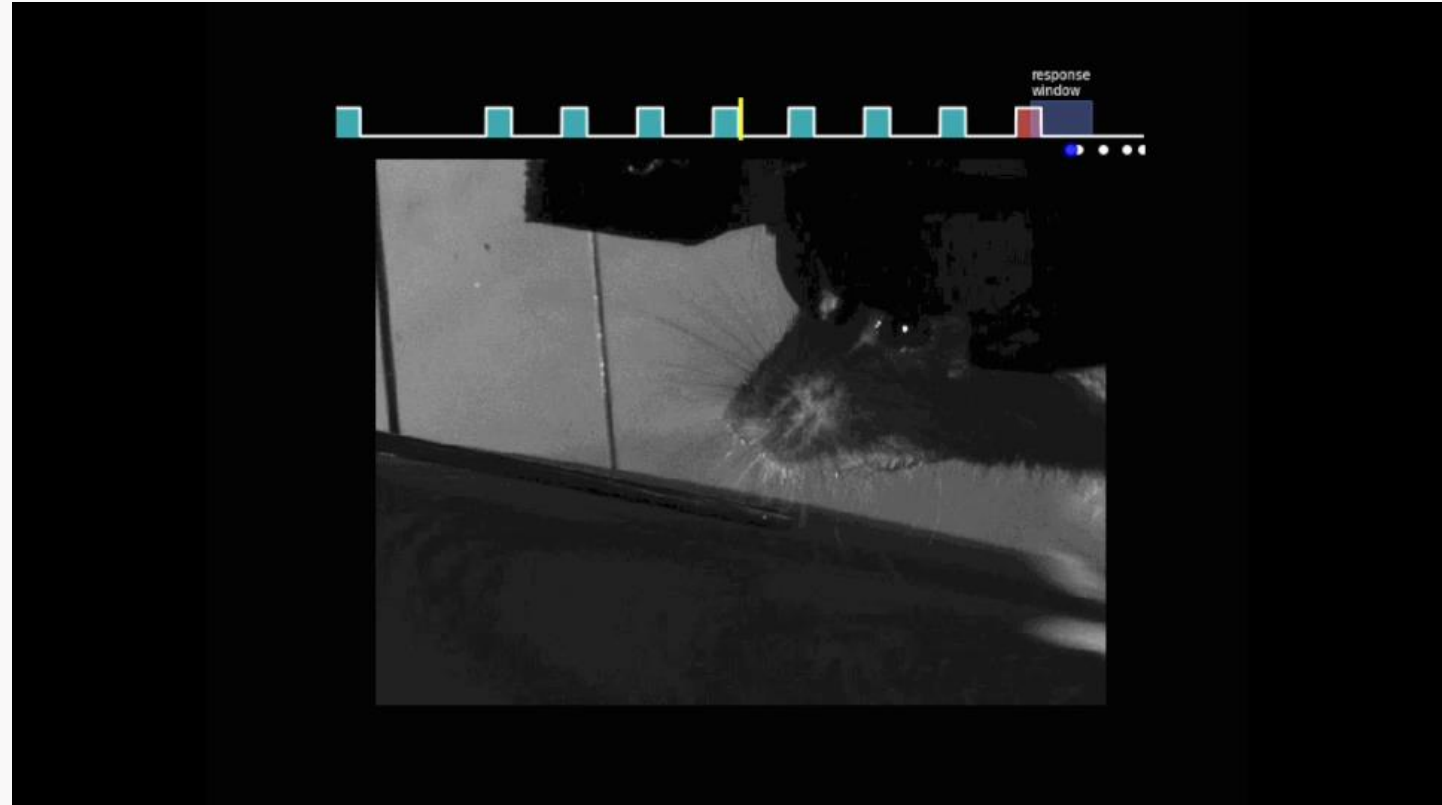
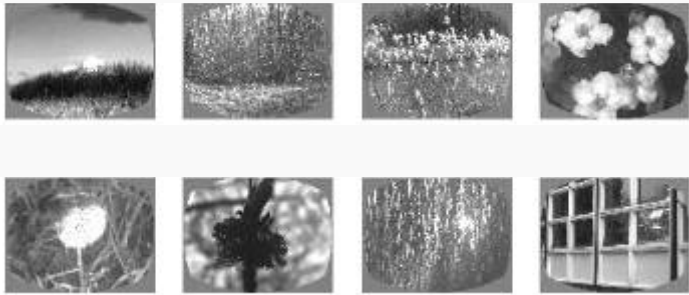
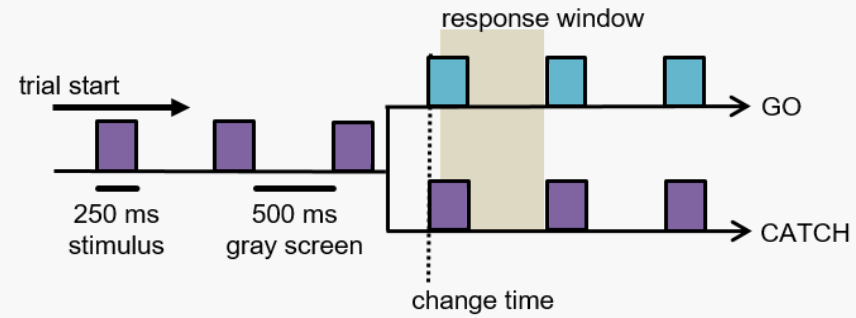
Data Processing



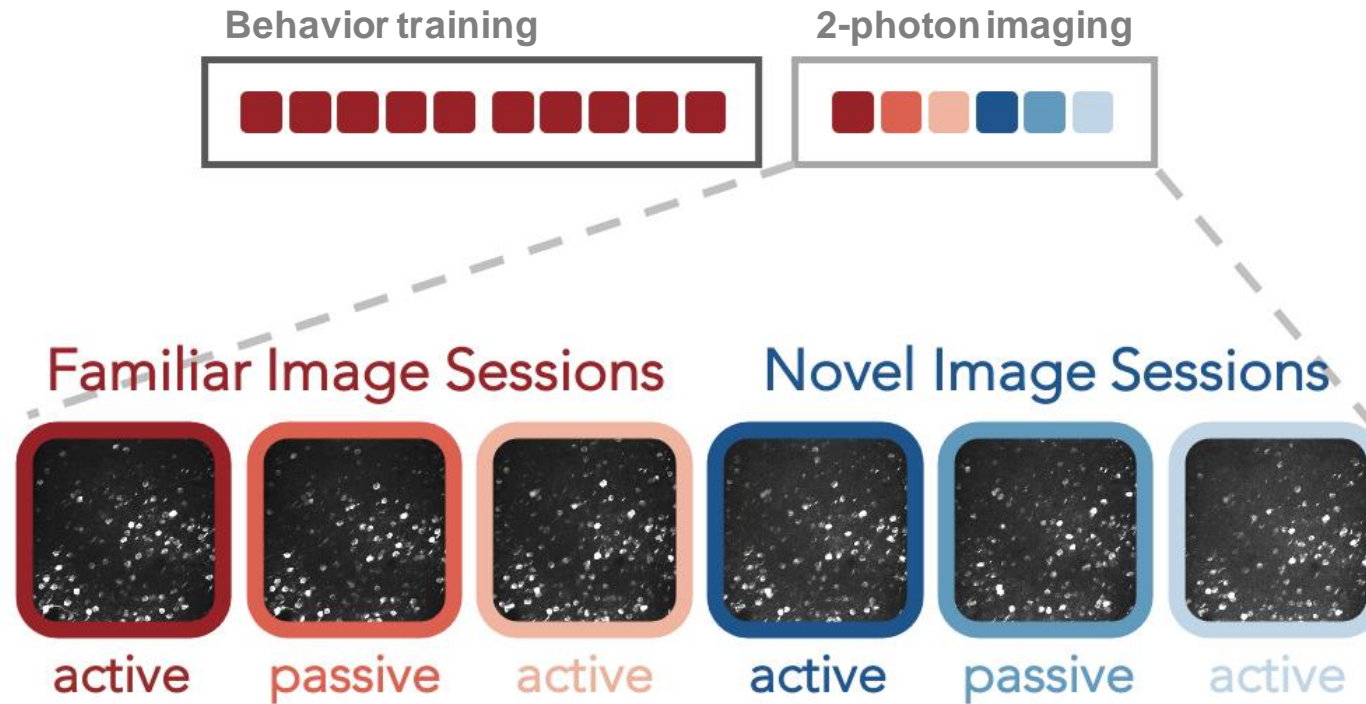
Web Product



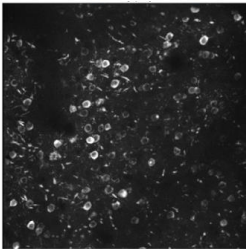
# Change Detection Task



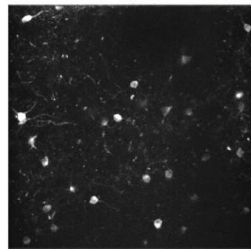
# Experimental design



**Excitatory**  
Slc17a7-IRES2-Cre;CaMk2-tT/  
Ai93(GCaMP6f)



**SST Inhibitory**  
Sst-IRES-Cre;  
Ai148(GCaMP6f)



**VIP Inhibitory**  
Vip-IRES-Cre;  
Ai148(GCaMP6f)

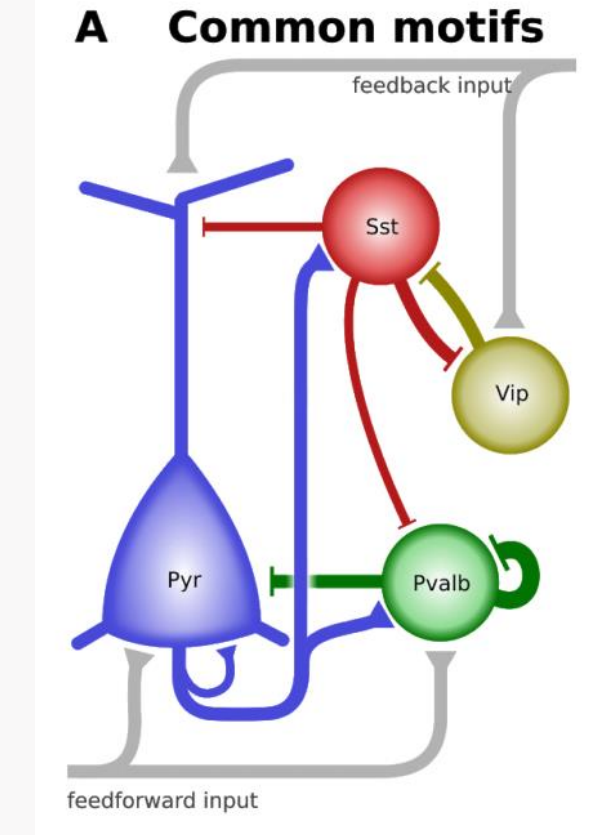
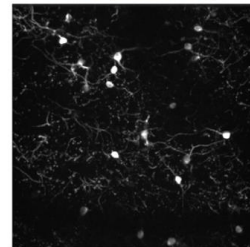


Diagram from Campagnola,  
biorxiv, 2021



# Dataset features

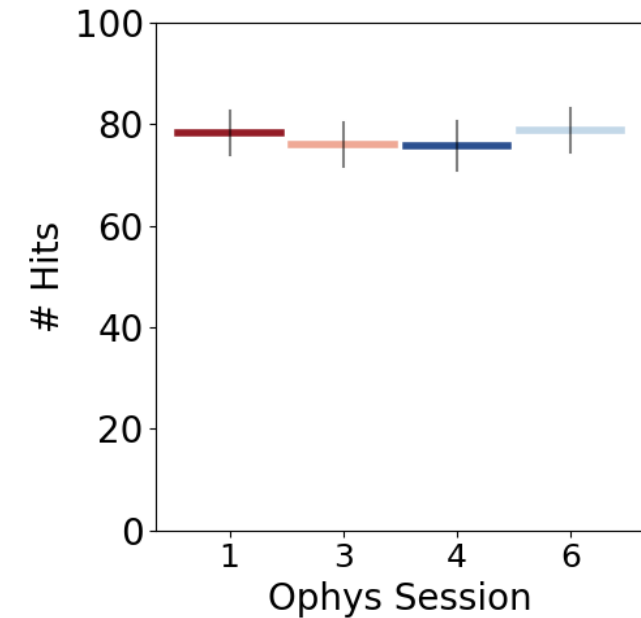
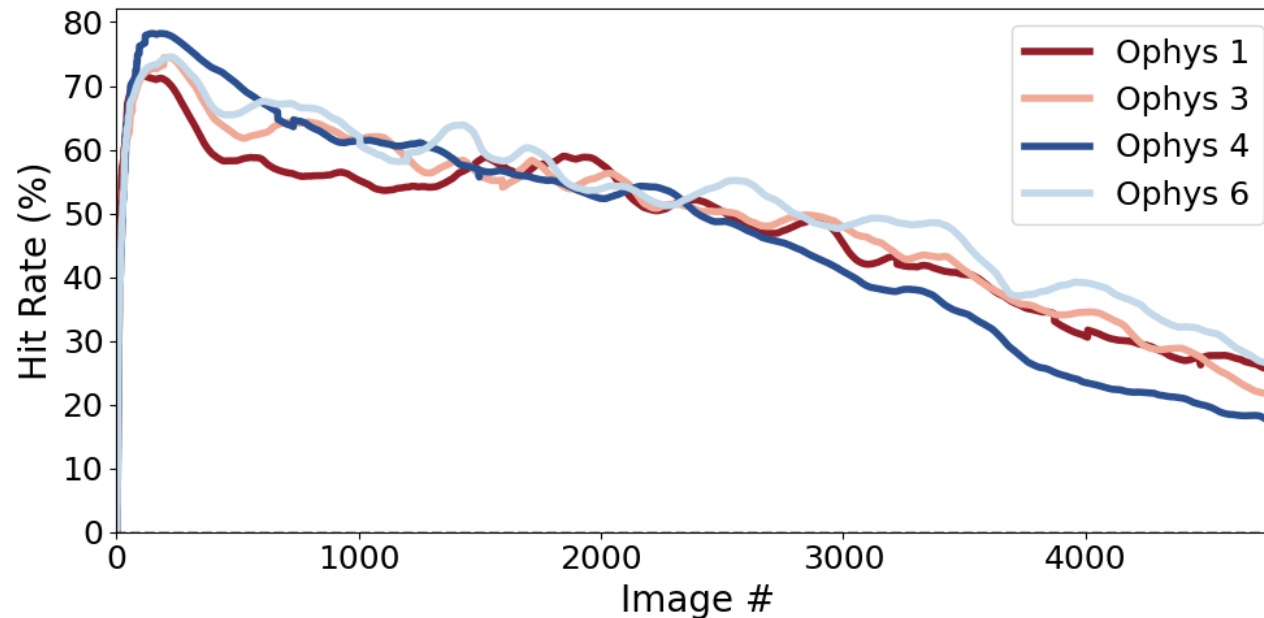
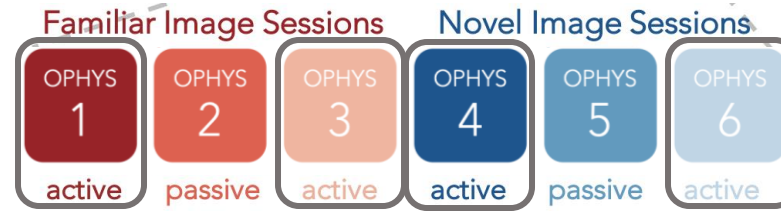
- **Visual Change Detection Behavior**
  - Mice respond to changes in image identity
  - 5% of images are randomly omitted
  - Running, licking, and pupil diameter
- **Multi-day Cell tracking**
  - Three sessions on a familiar image set
  - Three sessions on a novel image set
  - Active and passive behavior sessions
- **Cell Type specific 2-photon calcium imaging**
  - Pan-Excitatory
  - SST Inhibitory
  - VIP Inhibitory
- **AllenSDK**
  - NWB files
  - Python codebase

Data access at: <https://portal.brain-map.org/explore/circuits/visual-behavior-2p>

# Example Findings from this dataset

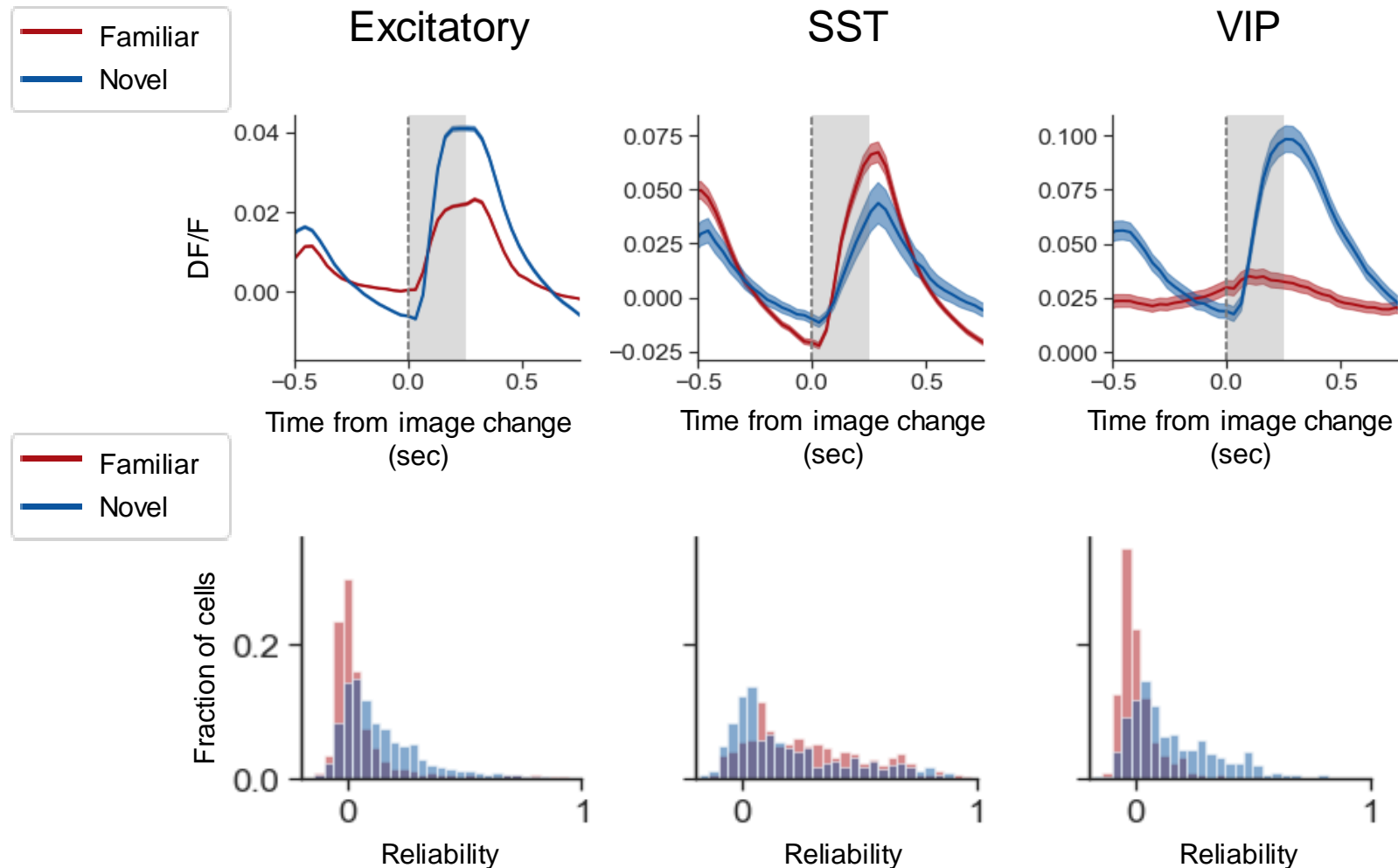
- **Behavior**
  - Task performance generalizes to novel images
  - Mice disengage over the course of a session
- **Image novelty modulates neural responses**
  - Increased activity from Excitatory and VIP neurons
- **VIP neurons respond to image omissions**
  - But only during familiar image sessions

# Task performance generalizes with novelty



- Performance is similar across familiar and novel image sets
- Mice perform best at the start of sessions, and then disengage

# Novelty increases the magnitude & reliability of image-evoked responses in Excitatory & VIP neurons





# Population averages reveal strong VIP activity after omissions during familiar image sessions

