

The Influence of Sensory Conditions on Social Behavior and Brain Activity in Zebrafish

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Background Information:

- Zebrafish are highly social and provide an excellent model to study social behavior
- Previous work supports the importance of the forebrain in social behavior in zebrafish
- A specific sensory system or sensory interaction may support social behavior

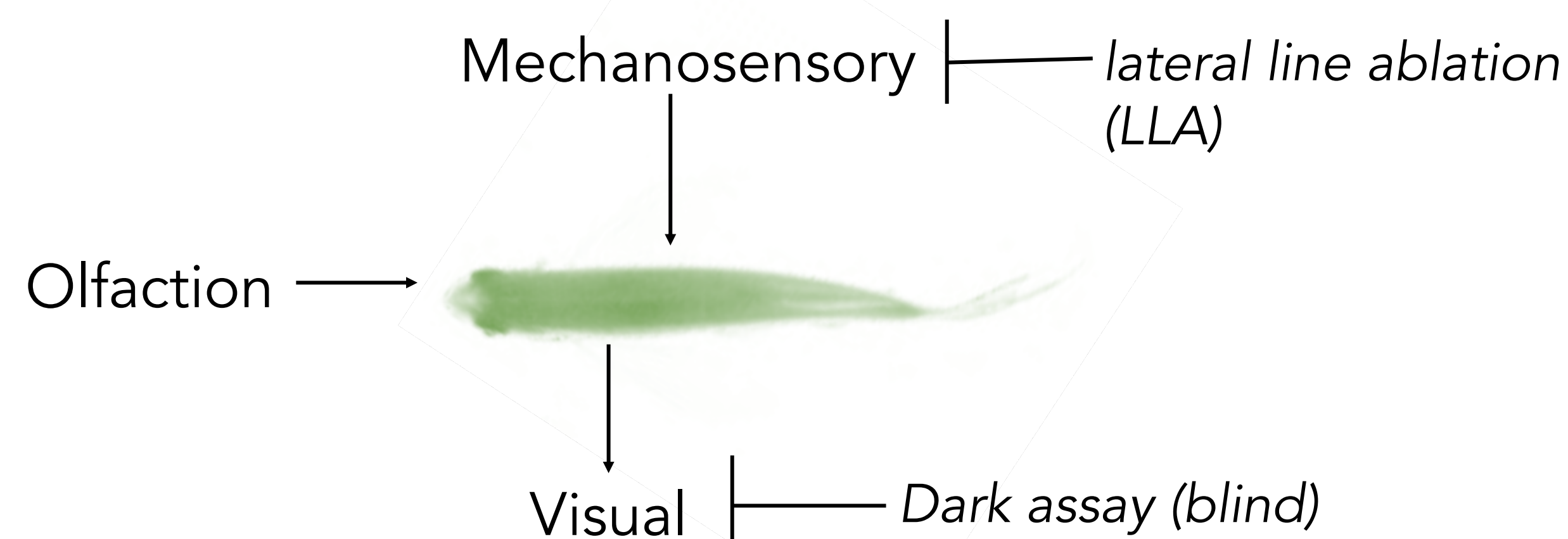
Methods:

Behavior: Recorded in a 9" diameter open tank

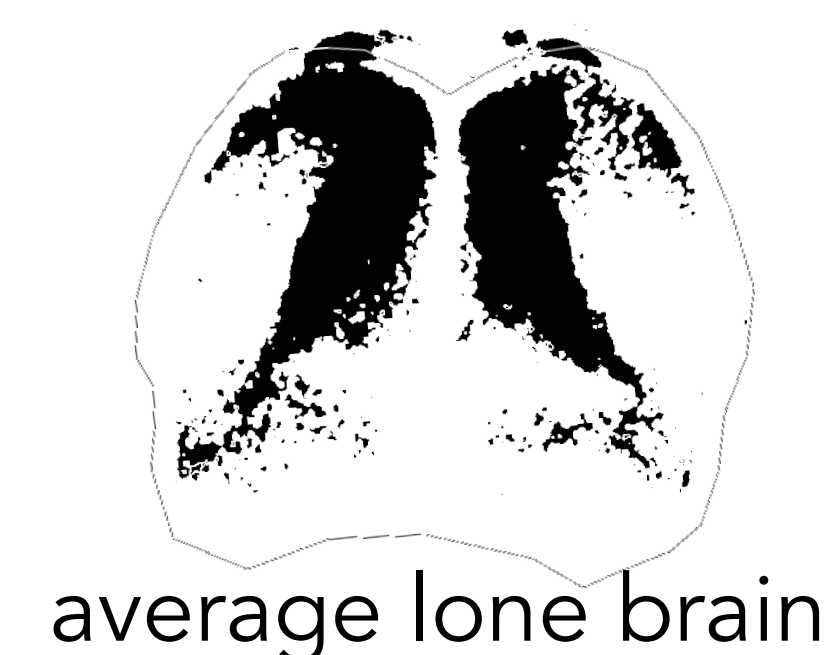


| Motif | Orienting | Following | Dispersing |
|----------|-----------|-----------|------------|
| Angle | different | similar | different |
| Distance | close | close | far |

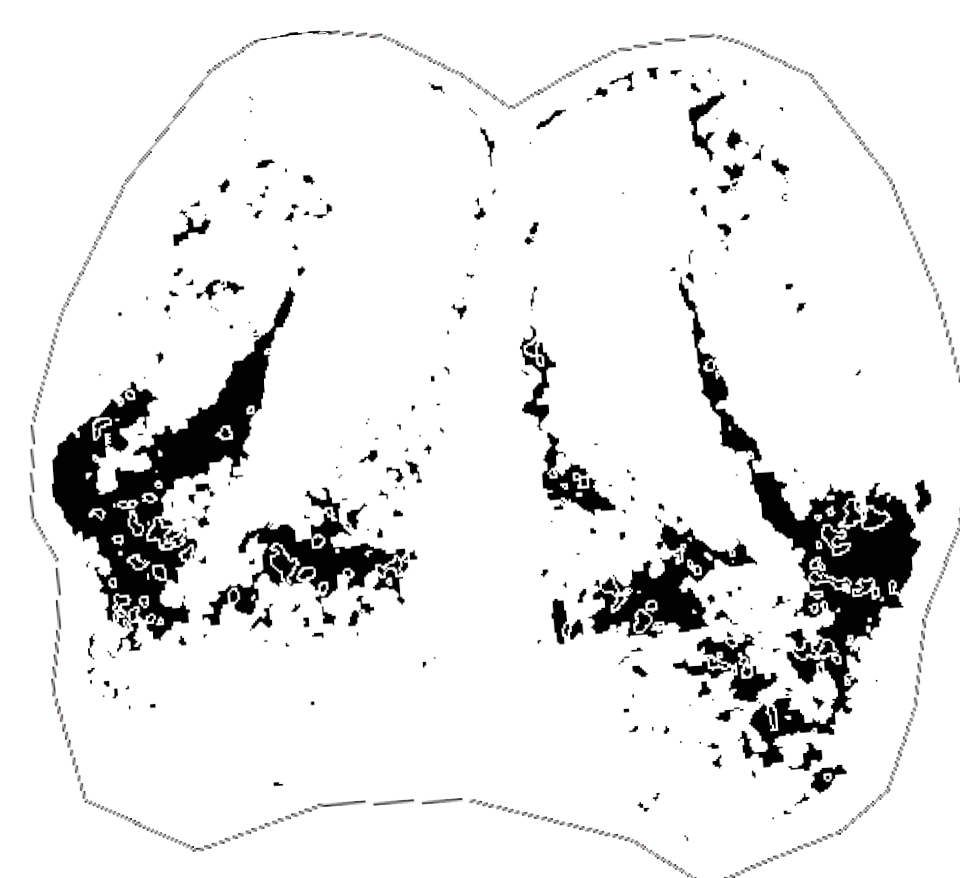
Sensory Manipulation:



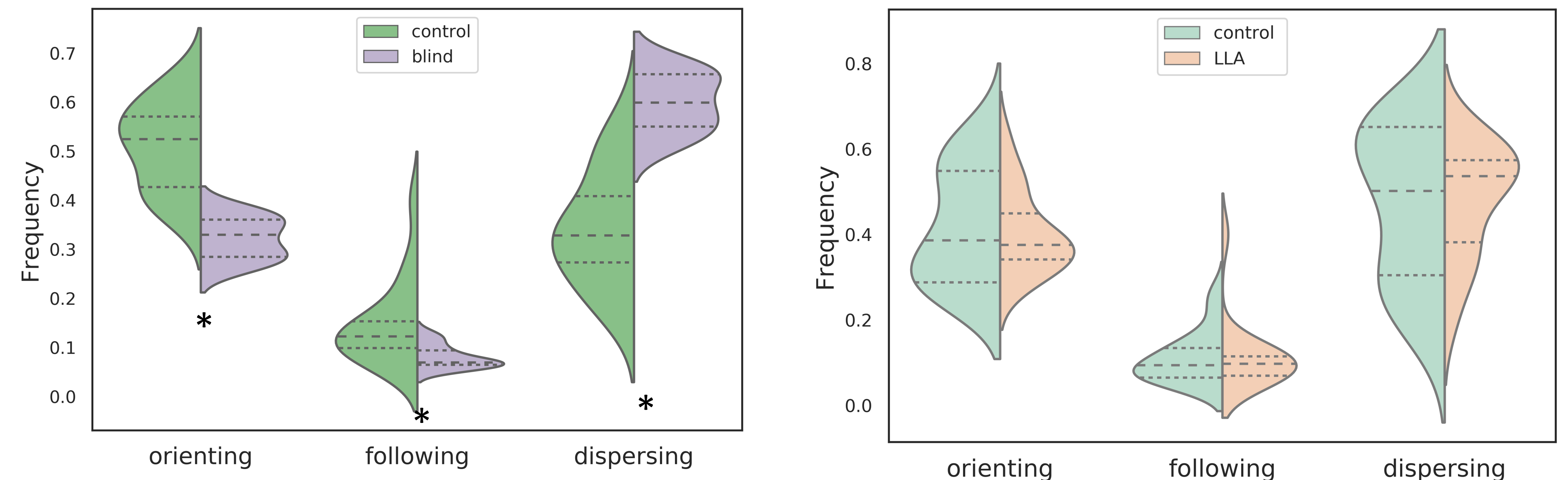
Brain Activity: labeled with florescent antibodies
pERK/ERK ratio acts as measure of brain activity



social only
(avg social – avg lone)



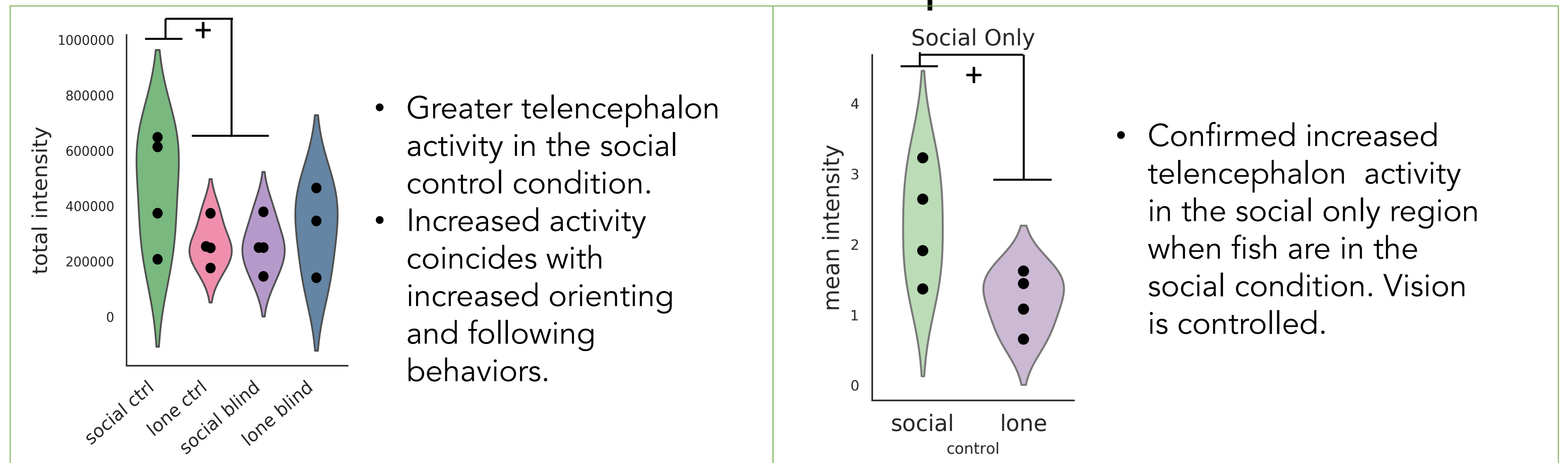
Social Behavior is Visually Driven:



Significant vision effect on all three behaviors. No significant effect of mechanosensation

* Indicates $p < 0.01$

Social-Visual Activation of the Telencephalon:



Principal Conclusions:

- Social behavior is visually driven. Loss of vision reduces orienting and following behavior and increases dispersing behavior.
- Subjects in the social condition show more brain activity than lone fish in the forebrain
- Location of neural activity suggests learning and memory is involved in social interaction

Future Directions:

- Manipulate olfaction and observe how behavior and brain activity changes.
- Explore hierarchical clustering of behavior to analyze more complex motifs.
- Analyze brain activity in three dimensions to gain insight to anatomical regions of importance.