Influence of Percieved Geometry in Zebrafish Group Behavior Patterns.

The group behavior of animals is complex, with drastically varying structures among different species and environments. Many animals move in groups to accomplish various tasks required for the survival of the individuals. One specific example of group behavior is Zebrafish; they have unique characteristics that allow us to better understand how they communicate. Their two main grouping methods are shoaling, swimming in close proximity, and schooling, moving cohesively in one direction.

Zebrafish are one of the model organisms in scientific research because they are relatively simple to work with since they have short gestation periods and develop quickly. By using zebrafish, we want to expand on the existing active matter research, viewing the fish as an active particle that can sense their environment. We can discuss how both physical geometry and how they perceive geometry are important for modulating the behavior of the fish, which is different from other active matter systems

As part of our data analysis, we made different simulation models to compare to what we observed for our given shapes. Our tests focused on the density, shape, and size of the tank, which we found to all contribute to how the fish swim as a unit. By placing these fish in tanks with sanded edges, we found that they swim further away from the boundaries, creating a more uniform swimming pattern. We concluded that not only is the geometry of the confinement important for the behavior but how the fish process sensory information about the confinement is equally important. Future experiments look to expand on seeing how age contributes as a factor as utilizing more different geometries and levels of sanding contributes to schooling and shoaling.