

You Can Lead a Fish to Water but You Can't Make Them Swim: Maze Navigation in Black Ghost Knife Fish

Ry Dennis, Aurora Solla

Reed College Biology 342

Background

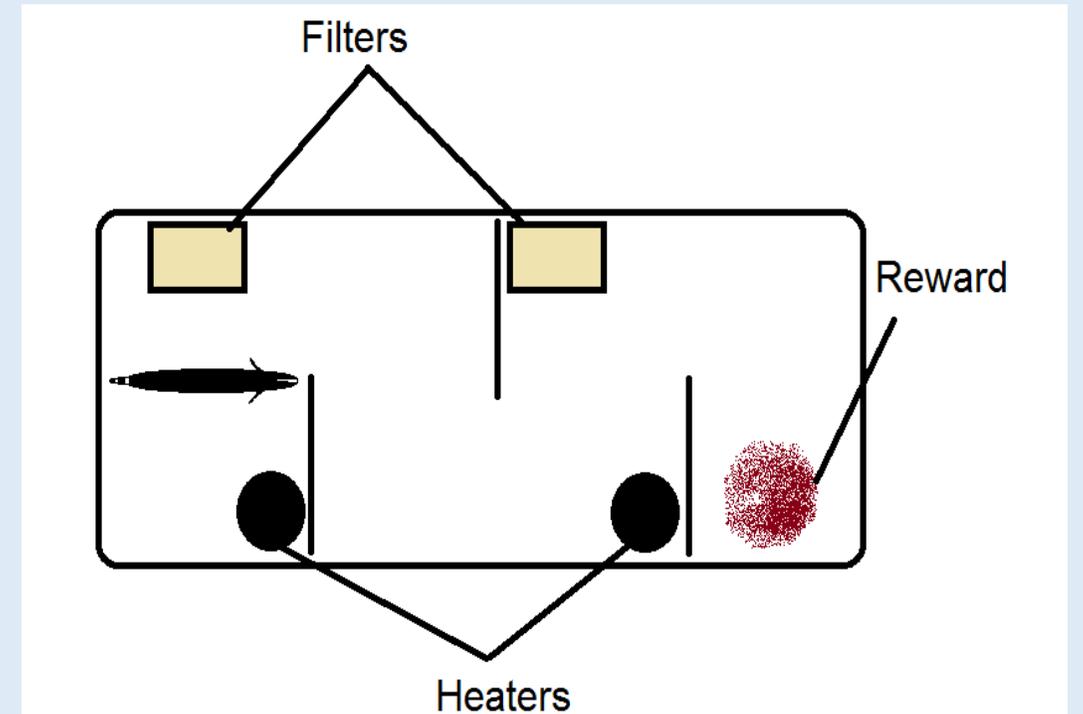
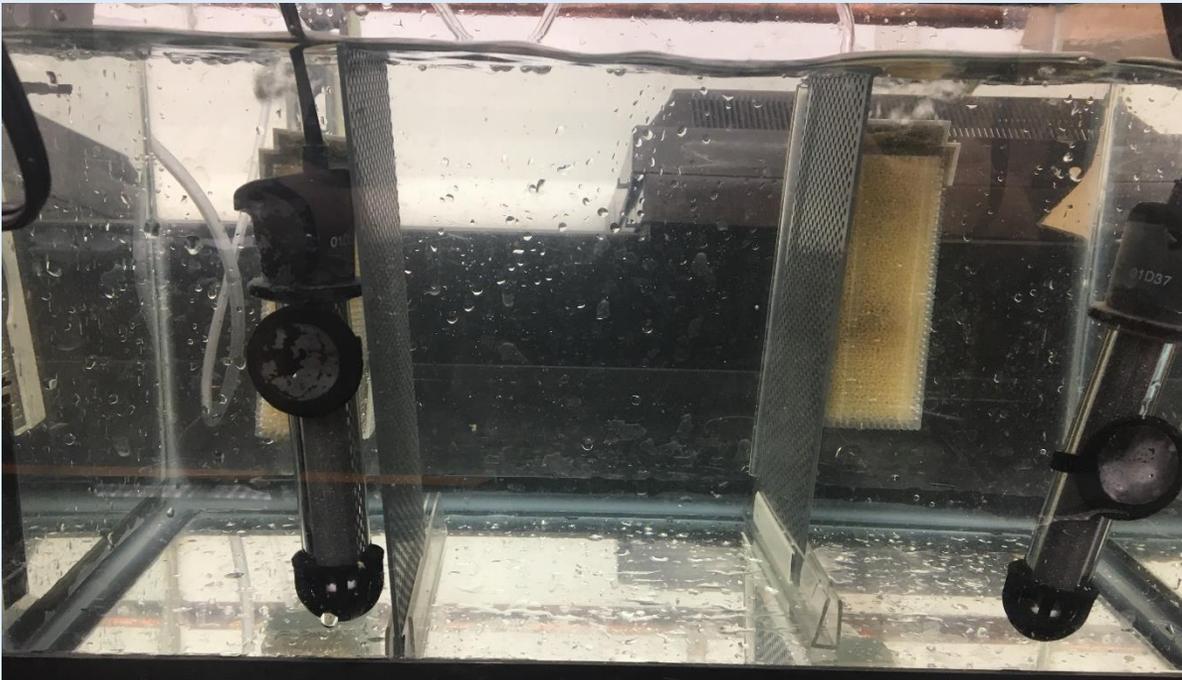
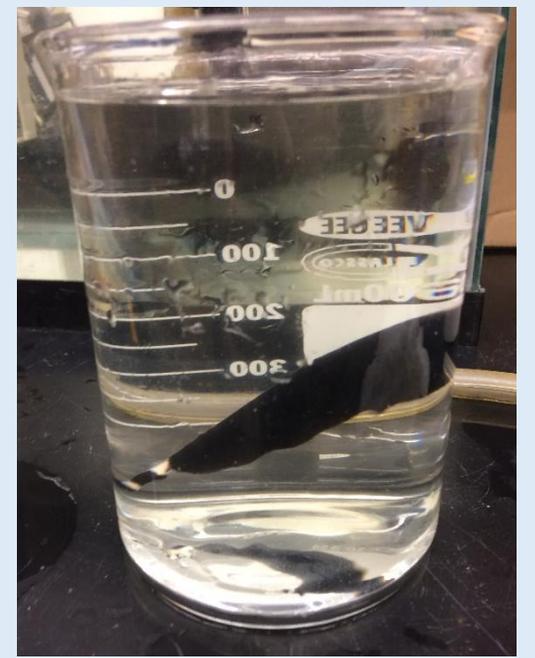
- Black ghost knife fish (*Apteronotus albifrons*) are an electric fish from the Amazon
- They emit a continuous wave of weak electric energy
- They use electric fields to navigate and catch insect larva
- Their electric field generation is highly temperature sensitive.



Can black ghost knife fish learn to navigate a maze?

Methods

- 8 fish tested and acclimated for 11 days
- Temperature in tanks measured daily
- Fish acclimated to test tank temperature before trial
- Fish timed and observed in maze
- Data analyses performed using excel



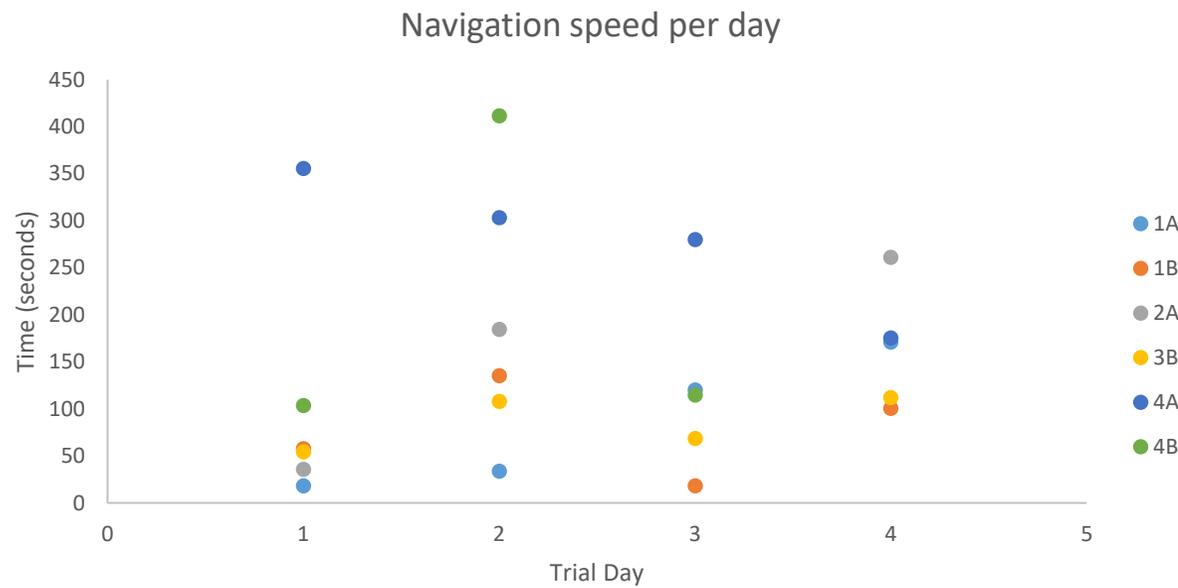


Figure 1. A graph of all tested fish (n=6) navigation speeds (seconds) per day. While individual fish show positive or negative trends, the data as a whole does not follow a clear trend.

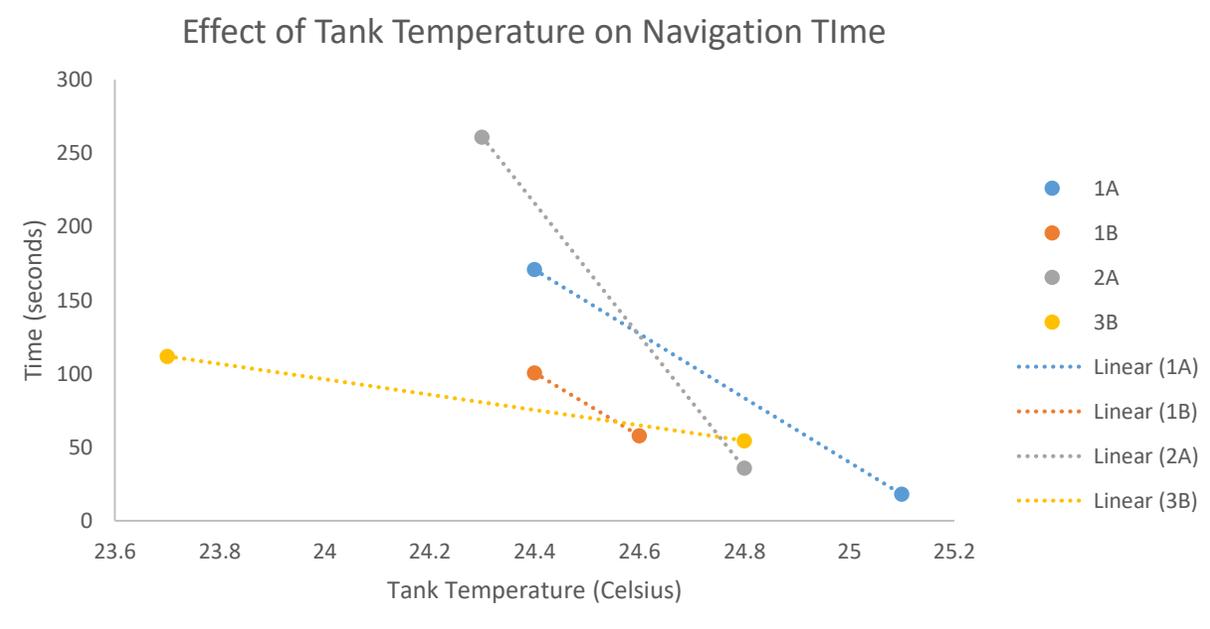


Figure 2. A graph of navigation time on the first and last days of testing, versus the temperature of the fishes' home tank on those days. As temperature of the home tank increased, time taken to run the maze decreased.

Conclusions

- Speed going through maze increases as temperature increases.
- Fish can be taught to go through mazes, but not the way we tried to.

Future Directions

How can we motivate black ghosts to go through mazes?

Does electrolyte concentration in water affect navigational ability?

Does fish stress have an effect on electrical wave frequency or maze learning?

How do you sex a black ghost knife fish?

References & Acknowledgements

Moller, Peter. 1995. "Electric Fishes: History and behavior". Chapman and Hall. London, UK.

Ho, Winnie W. Rack, Jessie M, Smith, G. Troy. 2012 "Divergence in androgen sensitivity contributes to population differences in Sexual dimorphism of electrocommunication behavior" National Institute of Health, 49-53. Published online Nov 2012

Special thanks to Emily Brod, Greta Glover, Kristine Hayes, Emily MacCalman, Suzy Renn, The Wet Spot Tropical Fish, and of course the fish.

Photo credit to Youtube user LowTech Tank