Session C, 2015 Second Place: Habituation of Creek Chub to a Chemical Alarm Stimulus

Benjamin Kosalek
Zachary Davis

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Habituation of Creek Chub to a Chemical Alarm Stimulus

ZACH M. DAVIS
BEN KO SA LEK
Introduction

- One minnow freaks out, they all do
- Karl von Frisch (1938) coined the substance as Schreckstoff “Fear Stuff” (Stensmyr 2012)

- Hypoxanthine-3N-oxide (H$_3$NO) (Parra 2009)
- Ostariophysi superorder
Hypothesis

- If we expose Creek Chub (*Semotilus atromaculatus*) to a chemical alarm stimulus without there being any danger/predators, the creek chub will habituate to the stimulus and won’t react.

- Null Hypothesis: That the creek chub will not habituate to the chemical alarm stimulus.
Methods
Method

- Control n=10
- Experimental n=10
- 10 for chemical alarm stimulus
- Surgical clamps = jaws of a predator
Results

Videos by: Zach Davis
Control vs Experimental

Control significant from experimental

Average Reaction Time (seconds)

T = -2.71
P = 0.019
n = 10
Minnows did not show capacity to learn throughout the trials.

Did not support our hypothesis.

T = 0.14
P = 0.894
n = 10
Older minnows had longer reaction times.

- **Small**: n = 4
- **Large**: n = 6

T = -0.92
P = 0.424
Discussion

- Innate behavior vital to survival (Chivers 1998)
- Size correlation appears to show that minnows learn to be more wary of the alarm stimulus
- Results confirm presence of chemical alarm stimulus shown in previous studies (Jung 2011, Speedie 2008)
Methods limited as to not cause undue stress to the minnows

- Physically injuring minnows to extract alarm chemical
- Only 5 trails per fish

Couldn’t obtain Hypoxanthine-3N-oxide (H₃NO)

Couldn’t obtain measurable concentration of alarm chemical
Follow-Up Studies

- Test different species of minnows
- Perform more trials per fish
- Further compare learning abilities between different age ranges
Why is this important?

- Intrinsic part of the food web
- Feed on many aquatic invertebrates and eaten by many upper trophic level predators
Conclusion

We found that Creek Chubs did not exhibit the ability to habituate to their chemical alarm signal and ignore it.
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Questions?