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Session D, 2016 Third Place: The Response of American Toads (*Anaxyrus americanus*) to The Urine of Distressed Conspecifics

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Neyra Benoit, Ben Czapranski, Dwight Hospedales, Justin LaCorte, "Session D, 2016 Third Place: The Response of American Toads (*Anaxyrus americanus*) to The Urine of Distressed Conspecifics" (2016). *Cranberry Lake Biological Station*. 17.

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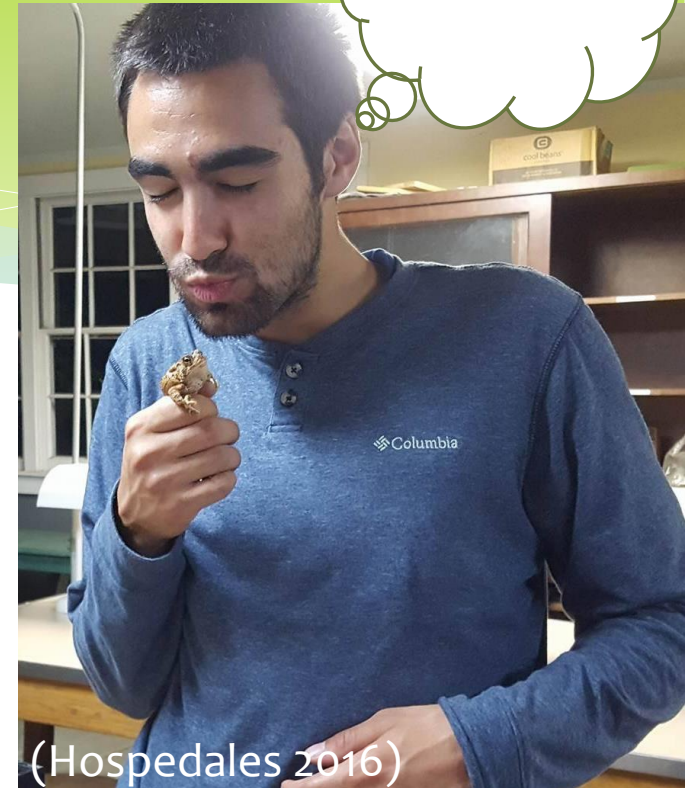
The response of American toads (*Anaxyrus americanus*) to the urine of distressed conspecifics



Ben Czapranski, Neyra Benoit, Justin LaCorte, Dwight Hospedales

Observations

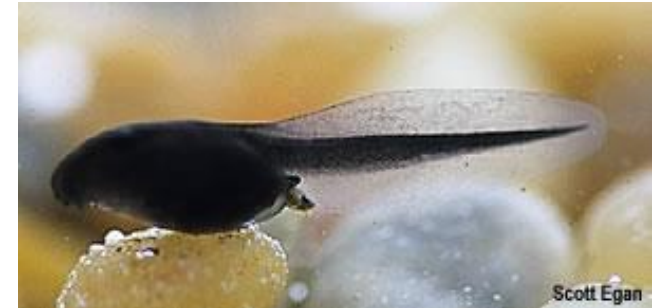
- * We noticed as we picked up toads, they will most likely urinate in our hands.
- * This inspired us to understand why specifically, American toads, exhibit this behavior.
- * Do they do this when distressed?
- * If there are alarm pheromones present, can they warn other toads of a potential threat?



Background

It is known that larval anurans use chemical cues, but little is known about the use of chemical cues in post-metamorphic anurans (Chivers et al 1999)

- * Anurans communicate mainly through sound, but chemical cues also plays a role in sexual communication in frogs (Schlute & Rössler 2013)
- * Pheromones play an important role in the antipredator behavior of amphibians (Rajchard 2006)
- * American toads will usually empty their bladders if a human tries to pick them up (Gibbs et al 2007)



Hypotheses

- * Research Question: Do American toads avoid areas with the urine of a distressed conspecific?
- * H_{o1} : American toads will not have preference for neither water nor the urine of a conspecific.
- * H_{a1} : American toads will have a preference for water over the urine of a conspecific.

Hypotheses

- * H_{02} : There will not be a difference in the distance traveled away from the urine between large (>5cm) American toads and small American toads (<5cm)
- * H_{a2} : There will be a difference in the distance traveled away from the urine between large (>5cm) American toads and small American toads (<5cm)
- * H_{03} : There will not be a difference in the distance traveled away from the urine between male and female American toads
- * H_{a3} : There will be a difference in the distance traveled away from the urine between male and female American toads

Methods: Study Site

- Collected toads behind cabins and walked Chair Rock Trail (~1/2 mile trail)
- Total of 37 toads
- Experimental Unit: 30 trials
- Sampling Unit: Individual Toads



Methods



(Hospedales 2016)



(Hospedales 2016)

Collected American Toads at night.



(Hospedales 2016)



(Hospedales 2016)

Extracted urine from toads (noted sex)

Measured SVL of another toad to use for trial (noted sex)



(Hospedales 2016)

Methods

Placed 2nd toad through hole
(2 mins in cup)



Measured final distance toad
traveled after 2 minutes



Methods: Response Scale

Statistics used: Chi-square test and Two proportion test

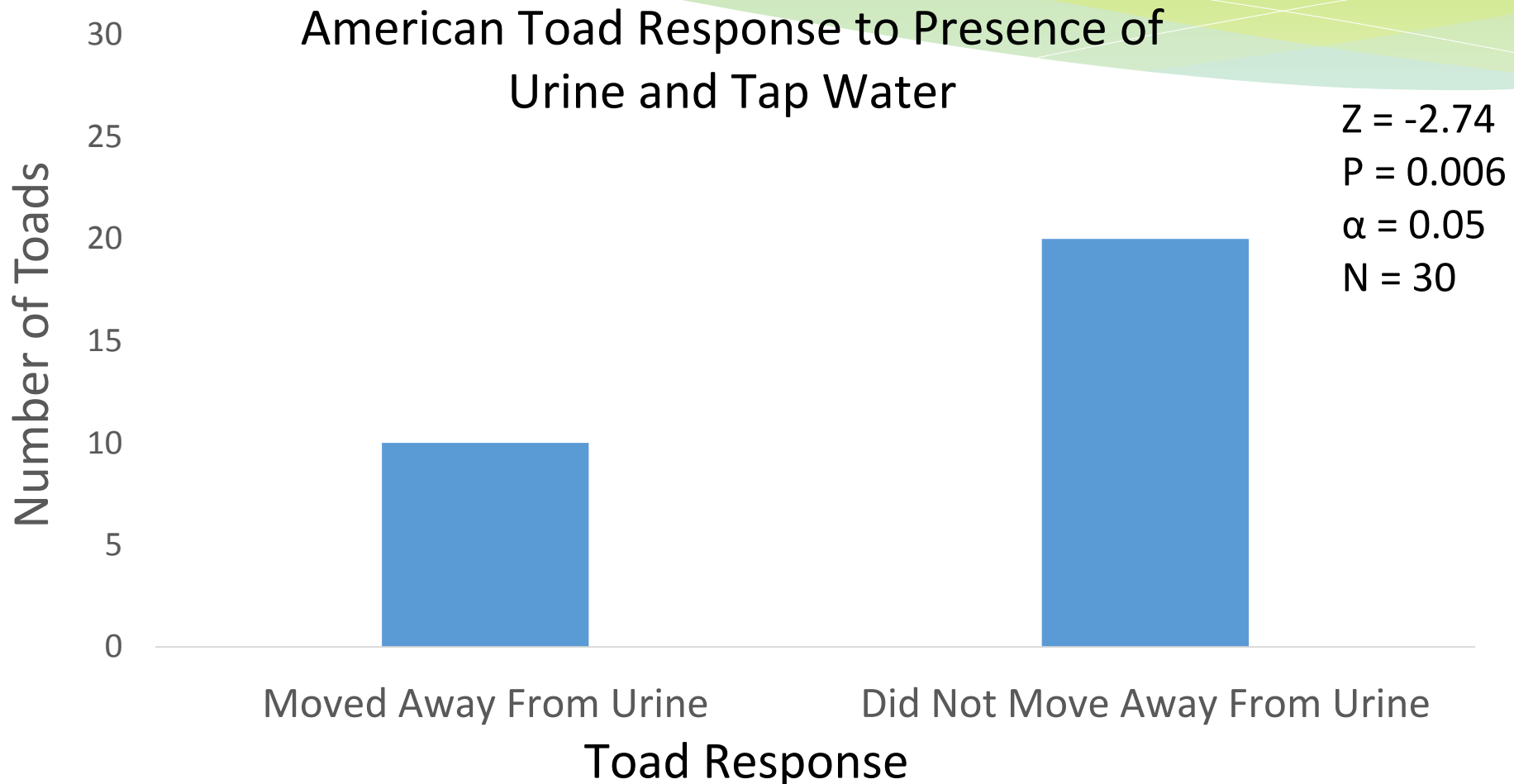
Independent variable: Presence of Toad Urine

Dependent Variable: Response of Toads

American Toad Response Scale

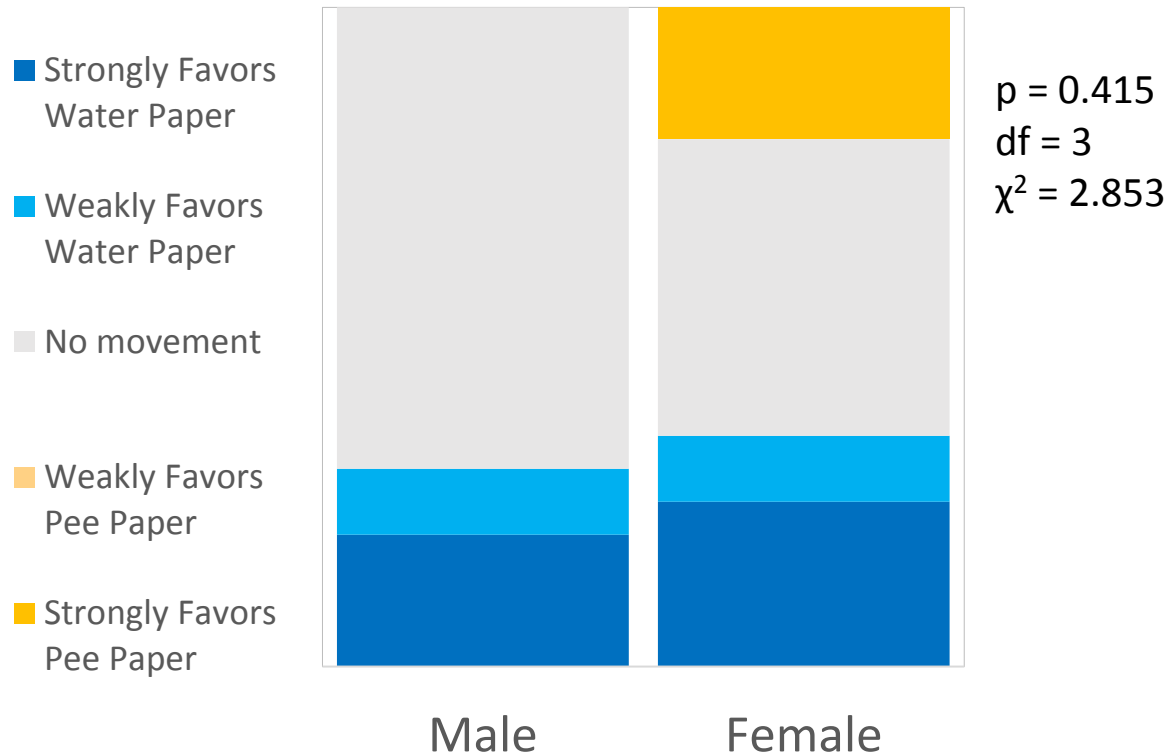
Strongly Favors Water Paper	>10cm towards water
Weakly Favors Water Paper	<10cm towards water
No Movement	0cm traveled
Weakly Favors Pee Paper	<10cm towards urine
Strongly Favors Pee Paper	>10cm towards urine

Results

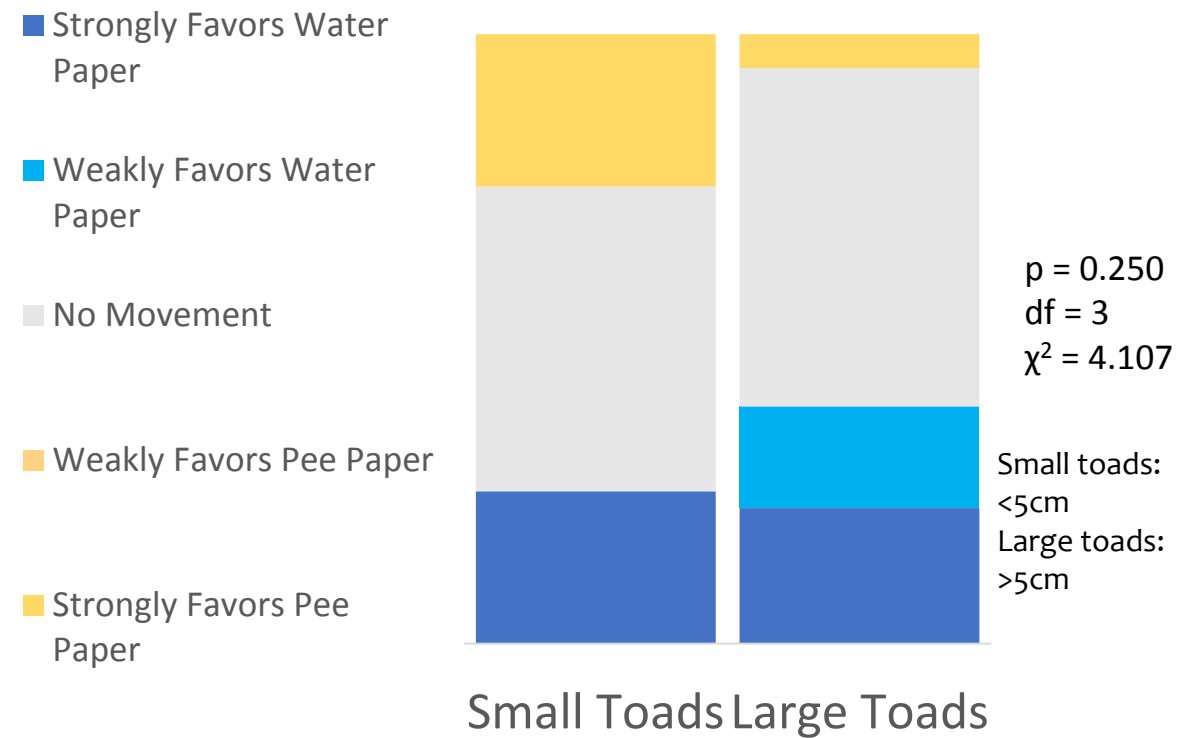


Results

Difference in the Reaction of American Toads to the Urine of a Distressed Conspecific Based on Sex



Difference in the Reaction of American Toads to the Urine of a Distressed Conspecific Based on Size



Discussion

- * Fail to reject H_{01} : *A. americanus* did not prefer water over the urine of a distressed conspecific
- * Fail to reject H_{02} : There was not a significant difference in the distance traveled away from the urine between large and small *A. americanus*
- * Fail to reject H_{03} : There was no significant difference in the distance traveled away from the urine between male and female *A. americanus*

Discussion

- * American toads may rely on cryptic camouflage to avoid predation (Heinen 1994).
- * Like other amphibians, American toads have poison glands which discourages predators from eating them (Mailho-Fontana et al).
- * The toads may not have known how to react in a new, unnatural environment.



Discussion



Errors/Critiques:

- * Should not have exposed the toads to each others scent before trials
- * Have toads smell urine for more than 2 minutes
- * Should have used clear jar to reduce stress

Follow Up Studies:

- * Test the chemical compounds in urine
- * Chemicals in urine can be stronger in certain seasons



Conclusion

- * We found that American toads at Cranberry Lake Biological Station do not actively avoid areas with the urine of a distressed conspecific.



Acknowledgments

Thank you to

- * SUNY ESF
- * Giuseppe Tumminello
- * Cranberry Lake Biological Station work studies and staff
- * Jack Tessier
- * Herpetologist, Harrison
- * Dr. Kimmerer



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We'd also like to thank all the toads that participated in our research! Questions?

