AUS TEACHING FORM III

LABORATORY CLASS EXERCISES INVOLVING LIVE ANIMALS

A. CLASS NAME AND EXERCISE(S)

National Science Foundation GK-12 Grant program titled Engineering in Practice (EiP). One of our grant program initiatives is the Summer Engineering Academy (SEA), which takes place this July 7-9 and July 14-16. This experience is designed for rural, high school science teachers (N = 9) and students (N = 30). A current OU graduate student in Zoology will be designing and implementing the following lesson and related activities.

B. EXERCISE DESCRIPTION(S)

The SEA lesson will be using dwarf hamsters (Phodopus Campbelli) to demonstrate learned behavior. Each group of students will use a hamster in a Y-decision maze task. Please refer to the teacher’s guide below for detail of the lesson. The students will be shown proper handling techniques, and the animals will be removed from their home cage for a period of no more than 20 minutes at a time. The animals will be kept after the experiment for future demonstrations of the lesson. Animals are purchased through a local pet store and will be kept in a private home, cared for by a trained individual in accordance to Institutional Animal Care and Use Committee Guidebook (http://grants.nih.gov/grants/olaw/GuideBook.pdf).

This lesson is written to give future teachers the freedom to choose their preferred animal. Due to their ease of care, ease of extinguishing training and student preference, only the indicated hamster will be used for EiP program. For the purposes of this program, hamsters will be trained daily after weaning to perform standing, coming to name call, and maze. The Teacher’s Guide for this lesson is included (teacher information in italics) as well as relevant information from the cover sheets which will be provided to the teacher.

Teacher’s Guide:

Watch the demonstration of behavior. Show students any “tricks” you trained your animal. Suggestion are in the cover sheets. How is it the animal is able to perform these behaviors? Are they behaviors they are born with (innate)? This exploration will investigate other behaviors seen in animals.

Materials

Each group will need the following…

• 1 mouse, rat or hamster (housed in proper home cage with bedding, food, water, wheel, and chew toy)
• Y-maze Instructions for making your own y-maze are in the cover sheet
• Treats (Honey Nut Cheerios, cheese and/ or peanut butter)
• Small holding container with wire mesh cover
• Stop watch
• Record sheet

Procedures:

1. Watch the demonstration on how to handle the live animal. See cover sheet for instructions on this. It is vital that these instructions are followed for the safety of the animal and yourself. Gloves must be worn to handle the animals. Rats need to have no food for 24 hours and mice and hamsters need to have no food for 12 hours prior to experiment. This is to ensure the animals are motivated to retrieve food. Food deprivation for longer than 24 hours in rats and 12 hours in mice and hamsters is not appropriate for this experiment.
2. Determine if your animal prefers left or right. (Make sure your area is quiet).
   a. Carefully remove an animal from the home cage and place it in the holding container. Be sure to cover this container and make sure the animal does not open the lid.
   b. Set the timer for 30 seconds.
   c. After 30 seconds, gently place your animal in the start box.
   d. Count to 10 seconds and open the maze doors.
   e. Record which side the animal crosses first (whole body must cross the door frame to be counted).
   f. Gently place the animal back in the holding container.
   g. Repeat “b” through “f” 5 times.

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3. Which side, if any, did your animal prefer? ________________

4. Now we will try to train your animal to go a certain direction. If your animal preferred a certain direction, choose the opposite direction your animal preferred.

5. Repeat steps “a” through “d” only this time place a small piece of food at the entrance of the correct side. Do this three times. If your animal makes an “incorrect” choice, remove it immediately and start over. If your animal takes longer than 60 seconds to make a choice remove it and start over.

6. Repeat step 5 three more times, but this time place the food further into the arm of the maze.

7. Repeat three more times, but this time place the food at the far end of the maze arm.

8. Place your animal back into the home cage for a 20-minute resting period.

9. Do you think your animal will learn to go down the chosen arm without a food reward? Why or why not? Student answers will vary depending on their opinion. Possible answer may include that the animal is only going toward the smell of the food or that yes, the animal has learned.

10. Now let’s see if your animal will go down your chosen arm…

11. Repeat steps “a” through “g” and record your animal’s chosen arm. If your animal takes longer than 60 seconds to make a choice, remove it and start over.

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Total right ______  Total left ______
Be sure to provide normal food amounts after the experiment is over. In actuality it takes time for memory of learning to “consolidate” or become part of permanent memory for later recall and repetition of training strengthens any preferences. To demonstrate true learning, it would be best to perform step 12 the next day. If time does not allow this, animals should still show some short term preference although may tire easily and not make choices at all. If animals do not make choices relatively quickly, they need a longer break.

Concept Development

1. Which side, if any did your animal prefer? __________________
2. Do you think your animal learned to prefer this direction or is this behavior innate? Explain. If the animal preferred the trained side even without food, students should conclude that the animal has learned.
3. Based on this experiment, what kind of behavior can animals display? Give evidence for your answer. Animals display learned behavior. Students should describe how their animal showed learning and compare this to learning in other animals.

Information from the Cover Sheets provided to teachers:
Animal Care - reference the following websites for care of your specific animal:
Mice and Rats:  
http://www.afrma.org/rmindex.htm  
http://www.wikihow.com/Take-Care-of-Mice  
http://www.wikihow.com/Care-for-a-Pet-Rat  
Hamster:  
http://www.wikihow.com/Care-for-a-Hamster  
http://www.hsus.org/pets/pet_care/rabbit_horse_and_other_pet_care/how_to_care_for_hamsters.html  
http://www.hamsterhideout.com/allabthams.html

In general, all animals need a clean, stimulating environment, be provided fresh food and water and be handled daily. In addition, be sure to make yourself aware of signs of illness and have a vet in mind prior to obtaining any animal.

This lesson should only be taught if you have intention of keeping your animals as pets or have an appropriate, safe place for them after your lesson is complete. No animal should be given to a student of any age unless the student and parent have been educated on its proper care.

Animal handling - Students need to be directed in the proper care of vertebrate animals in accordance to federal, state, and local laws. The following links may aid in this discussion:

It is important to hand train young animals (weanling to early adolescent) prior to using them for classroom demonstrations. If your animal seems prone to bite, you can wear gloves. Gently handle your animals daily by holding them with both hands, letting them walk from hand to hand and petting their backs. Although hand trained hamsters, mice and rats are not prone to biting, they will if not handled correctly. Mice and dwarf hamsters are very quick. With mice, you may begin by picking them up quickly by the base of tail (NOT the tip) and gently placing them in your hand. Rats are best picked up gently by midsection supporting their hind legs with the other hand. Hamsters can be scooped into your cupped hands. Do not squeeze any of the animals. Instead let the animal freely walk from one hand to the other. All animals need to be acclimated to their home cage and handled daily for at least a week (more is better) prior to introduction in the classroom.
Animal training: Hamsters, mice, and rats are all capable of learning “tricks” with rats being the easiest and hamsters being the most difficult to train. Working with your animal helps provide a more stimulating environment and if done properly (with the animals well being at highest priority) can be very rewarding and educational for your students. Below are some resources to help you train your animal. Mice can learn in the same manner as rats and hamsters. It is important to always stay calm with your animal and be patient. Some animals may take longer than other to learn a new trick. Treats are the best way to reinforce a behavior. Punishment should never be used.

http://www.petco.com/Content/ArticleList/Article/35/20/830/Can-I-Teach-My-Hamster-To-Do-Tricks.aspx
http://www.cavyrescue.co.uk/rat-article16.shtml
http://www.theagilerat.com/?id=30

C. JUSTIFICATION FOR THE NUMBER OF ANIMALS

The animals used will be 1 dam purchased pregnant from the pet store and her juveniles. This will allow for each pair of students to use a different juvenile subject. If necessary (illness or death of juveniles), dam may be bred using two stock males. New dams may be purchased if the original dam becomes ill or dies. A maximum of 2 adult males and 4 adult females will be used with no more than the progeny of 5 matings during the time frame of this proposal.