Lesson 1: Asking questions about animal behavior

Created by Jessica Schaefer, Nicole Korzeniecki, & Cassidy Cooper
The Ethogram & UC Davis Animal Behavior Graduate Group

Grade level(s): 5–8
Time: 45 minutes
Materials/preparation: Interactive google slides with links to animal videos; choose which animal behavior clips to show (tailor to location/student audience)

Learning Outcomes

1. Make observations about animal behavior
2. Distinguish between the 4 categories of animal behavior questions: *cause, development, function,* and *history*
3. Write a scientific question about an animal behavior for each of the 4 categories

Vocabulary

- Observation - description of something you see or measure with a tool
- Development - process that answers the question “how did it get that way?”
- Learned behavior - a behavior an animal develops through experience, practice, or watching others do the behavior
- Innate behavior - a behavior that develops without learning or experience; a behavior the animal is born being able to do
- Function (of an animal behavior) - how the behavior helps the animal survive or reproduce
- Evolution - the process of gradual change that forms new species and alters characteristics of species over long periods of time
- Hypothesis* - a possible answer to a scientific question that can be tested (or, a proposed explanation that answers a scientific question) (optional; definition not included in slides)
- Proximate* - Explanations describing **how** a behavior is gained or works (optional advanced vocabulary)
- Ultimate* - Explanations describing **why** animals historically gained a behavior; explanations describing **why** animals gained a behavior through evolution (optional advanced vocabulary)

Lesson Sequence

- **Hook:** Show a video clip (~2 min) of an interesting animal behavior
    - Possible videos:
        - (Currently in slides) Secretary Birds: https://www.youtube.com/watch?v=kwlBzmVa_dY
        - (Alternative video) Pufferfish courtship/sand shapes (narrated by David Attenborough): https://www.youtube.com/watch?v=B91tozyQs9M

    - Teacher: ask students to *list observations about the animal in the video* (specifically, observations about its *behavior*—what it is doing)
        - Define observation (if necessary)
        - Emphasize that observations are the starting point in science; before we can ask scientific questions, we need to make an observation
        - Students brainstorm observations as a group or "think, pair, share"
    - Next, ask students to come up with *curiosity-based questions about the behavior* (any questions are fine, just to get them thinking and curious)
        - Do this as a group or "think, pair, share"
    - Introduce **learning outcomes**: (1) Make observations about an animal behavior; (2) Distinguish between the 4 categories of animal behavior questions: *cause, development, function,* and *history*; (3) Write a scientific question about an animal behavior for each of the 4 categories
- **Sandwich eating behavior:**
    - Teacher introduces: *Let's investigate a behavior that we (humans are animals!) have all done in our lives: eating a sandwich* (or spam musubi, or poke bowl . . . Choose an example that will most resonate with students.)
        - Goal: introduce the 4 categories of behavior questions using sandwich eating analogy. Teachers ask the questions one by one and have students think of possible answers, guiding them toward an appropriate answer.
    - Cause: **What caused the behavior?** (Optional advanced terminology: proximate causal questions)
        - Ask students: *What caused you to eat a sandwich?* What happened that made you go and make yourself a sandwich and eat it?
        - Possible answers: I was hungry; it sounded good (had an appetite for it); I like sandwiches; it was lunch time; it was there
        - Explain: hunger is most often the cause for the behavior of eating. We feel hungry, and that's our cue to eat something
    - Development: **How did the behavior develop?** (Optional advanced terminology: proximate developmental questions)
        - Ask students: *How did you develop the ability to eat a sandwich?* Have you always known how to eat sandwiches since you were a baby? Or did you learn over time? If so, how did you learn? (optional: you can also talk about making a sandwich as part of this behavior)
        - Possible answers: my parent taught me how to make and eat a sandwich; I started by eating soft baby foods, and eventually I learned how to eat harder foods like sandwiches; I just knew how (instinct/innate behavior)
        - Explain: two main ways that animals **develop** behaviors: **learned** vs. **innate** behaviors
    - Function: **What is the function of the behavior?** (Optional advanced terminology: ultimate functional questions)
        - Ask students: *What is the function of eating sandwiches?* What is the purpose for your body of eating sandwiches; what is this behavior for? (If

students need additional prompting, ask “What would happen to your body if you did not eat anything?”)
        - Possible answers: to provide the body with energy/calories; to stop me from feeling hungry; to provide nutrients so the body can run/walk/grow/think; to obtain carbs/protein/fat; I eat sandwiches so that I don’t starve
        - Explain: the **function** of a behavior is how it helps the animal survive and reproduce, so the function of eating is to provide your body energy (so that you can breathe, pump blood, walk, think, etc.). Animals do various behaviors because those behaviors help them get food, avoid predators, survive, or reproduce
    - History: **Do other species have the same or similar behaviors? / Which species evolved the same or similar behaviors?** (Optional advanced terminology: ultimate historical questions)
        - Ask students: *Do you know of other species that eat sandwiches? What do other organisms do that is similar to eating sandwiches?* (If students have already learned about photosynthesis, can ask: “What do plants do instead of eating food?”)
        - Possible answers: yes, my dog/cat will steal people-food or sandwiches and eat them; other animals eat grains, meat or plants, but not sandwiches; other animals might mix foods together to make them taste better; all animals eat, but different types of food; plants don’t eat but they get energy from the sun instead
        - Explain: the behavior of eating is shared with other species of animals, but eating sandwiches is probably unique to humans. Other animals eat food to get energy, like humans, but plants make their own sugar using energy from the sun. Humans are more similar to other animals than they are to plants.
        - *Alternative phrasing for classes that have covered evolution and relatedness between species already:* Are there other species that evolved the behavior of sandwich eating or similar behaviors? Animals that are closely related to humans, like primates, also eat food using their hands and eat a mixture of plant foods and meat. Can discuss evolutionary history of behavior and how more related species are more likely to share similar behaviors rather than just comparing between species.
- Show another **animal behavior video clip**. Have students generate questions in the 4 categories about the behavior (fill in chart in the slides comparing sandwich questions to animal questions generated by students)
    - Show a new animal video
        - (Currently in slides) Lizard push ups: https://www.youtube.com/watch?v=9PIM12QxzIg
        - (Alternative option) Fiddler crabs: https://www.youtube.com/watch?v=hg9WoCwrB10

        - (Alternative option) Premature hatching tree frog tadpoles: https://www.youtube.com/watch?v=uH5SvJR6UkQ
        - (Alternative option) Springbok pronking (starting around 1:00): https://www.youtube.com/watch?v=qr5Sru8gGSk
        - (Alternative option) Kea breaking into trash bins: https://www.youtube.com/watch?v=bxoCuRuHlt8
        - (Alternative option) Puffer fish sand sculptures: https://www.youtube.com/watch?v=B91tozyQs9M
    - Give students several minutes to write down questions individually about the behaviors they saw in the video
    - Form small groups of 3-4 students and have students share their questions with their group; have each group pick their favorite 3 questions and share them with the class (e.g., write on a whiteboard)
        - You may want to project the sandwich chart onto a white board so students can write their questions in the appropriate box on the chart; groups can help each other decide which box/question category their questions belong
        - If teaching online, you can use a Jamboard (example provided in slides) or chat function to share questions; if using the Jamboard, students can post questions on sticky notes and then move their questions around to the appropriate box/question category
- **Wrap-up/conclude**
    - Briefly review learning outcomes
    - Ask students to recall the 4 categories of questions
    - Following the wrap-up: If students are interested, there is a slide of possible answers to the lizard questions we posed earlier.
    - If there is extra time, show the alternate videos of animal behaviors. Can ask students to come up with questions using the 4 categories for these different animals and their behaviors.

Lesson Part	Teacher(s)	Students	Time
1 - Hook	Play clip of animal behavior and prompt observations and curiosity questions; explain learning objectives	Generate observations and questions about animal behavior in the video (as a group or think, pair, share)	10 min
2 - Sandwich example illustrating the 4 categories of questions in behavior	Pose questions about sandwich eating for each category (*cause, development, function, histor*y), explain what each category means; fill in chart with questions, and student answers	Generate answers to the questions posed by teacher about sandwich-eating (based on their experience)	15 min
3 - Animal example illustrating the 4 categories of questions in behavior	Prompt students by listing each category one by one; record student questions and possible answers in chart (or, have students fill in themselves)	Generate questions for each category individually, in break-out groups (optional), and as a class Optional: students brainstorm answers to their questions	15-20 min
4 - Wrap-up	Review learning outcomes	Recall what an observation is and the 4 levels of questions	5 min