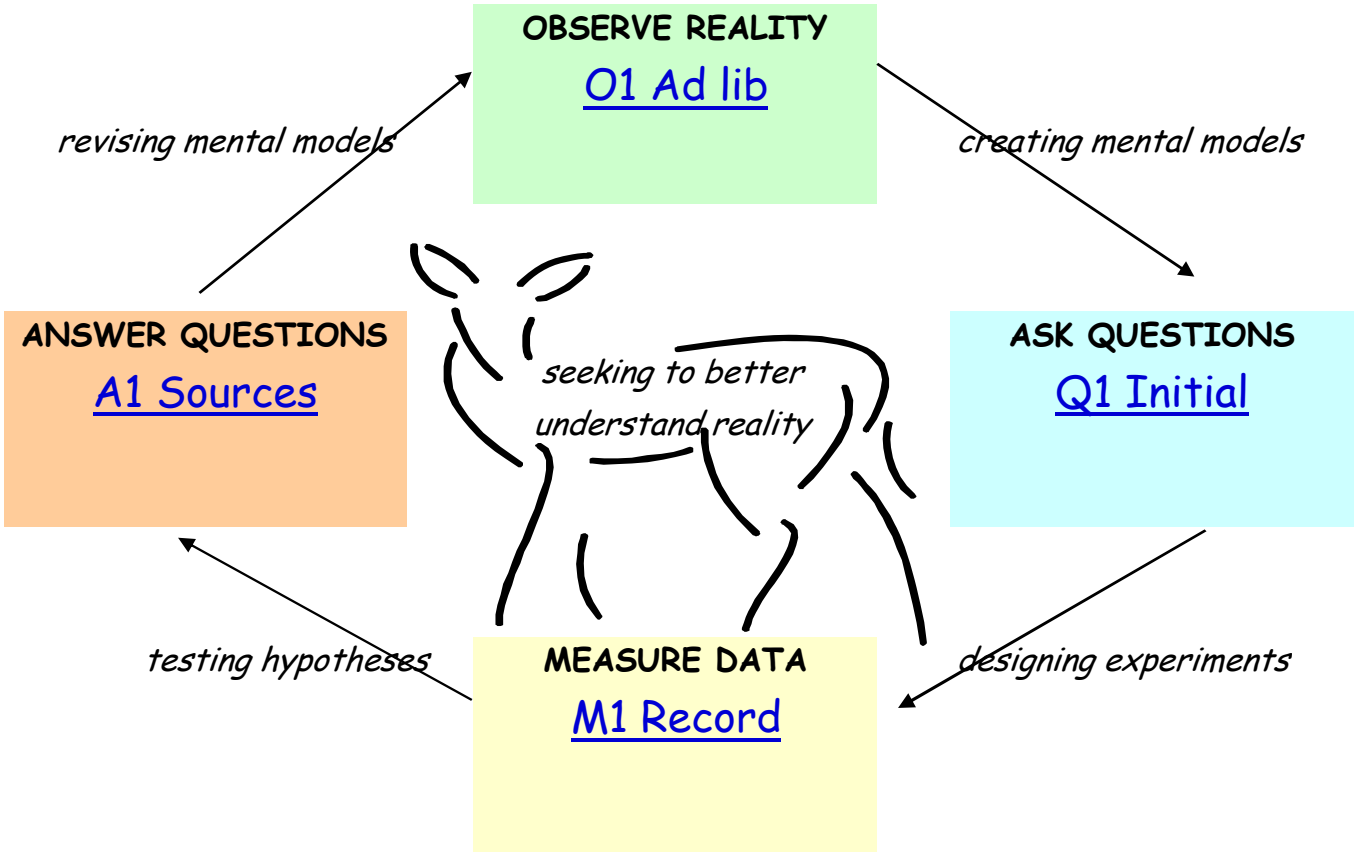
SCIENCE IN ACTION!

Nature's Partners: predators, prey & you

Module 1. Scouting Deer Behavior



GENERAL LEARNING GOAL: Experience the nature of scientific inquiry (observation, measurements, asking and answering questions), as an alternative to folk psychology. Explain how each of these steps in the inquiry cycle relates to the others and helps us understand the science behind the myths of animal behavior. Explain how all inquiry involves these four steps; however, each person may choose to enter the cycle at a different place.

SPECIFIC OBJECTIVES FOR EACH MODULE IN THIS INQUIRY CYCLE

Module 1. Scouting for deer

1.1 Distinguish between observation, inference, and questions that arise from freestyle (ad libitum) notes about deer communication

1.2 Use video technology to record the body language of deer for further detailed analysis.

1.3 Practice critical thinking in distinguishing between reliable (scientific) and unreliable sources of information about deer

MAP FAQ SOURCES

Name:	Daniel Alex Minnick
Date(s):	10/29/09
Duration (min):	~40

O1 Ad Lib (freestyle) Observations

STEP 1 Find a place to watch deer and video the behavior (see M1), or choose video clip(s) you find on the web (e.g. "Red Deer Roaring") or provided by your instructor (clip 1). Write the source information in the box provided and refer to it by code in the column on the left (VIDEO). Empty your mind of preconceptions and try to absorb the environment as if you were inside the skin of the deer. Note what you observe about the place, habitat, clues about the season, other animals, etc. Write your general observations in the top box.

STEP 2 Replay the video clip, and choose one communication display to analyze in more detail in terms of sender/receiver. Write your observations about the behavior of the deer in the box marked "sender". Observe how other members of the same species respond ("ignore" is also a response), and write your notes in the box marked "receiver".

STEP 3 Choose another video of the same display behavior (may be another scene or individual in the same clip). Repeat STEP 2 to fill in the next sender/receiver boxes. Note any similarities and differences between the behaviors, compared to your first observations. .

STEP 4 Read the analysis categories in the box at the bottom of this page . In the far right column, write the code(s) that apply to what you wrote in the center column.

SPECIFIC INFORMATION ABOUT THE SOURCE VIDEO(S), AND MY CODE FOR IT:

Agonline Website: Elk Clip1 & Clip3

VIDEO CODE	AD LIBITUM NOTES ON WHAT I OBSERVED	ANALYSIS CODE
Clip1	general notes about location, species, behavior & context: Male elk bugling, very high pitched, females walking away, hilly habitat, one male, up to seven females around, shrublands, no females approaching male, male moving around, male's head high bugling loudly, high altitudes, low lighting	OBS;INF

Clip1	sender: male, head high, ears moving, vocalization: screams & grunts, high pitched, walking around, long-winded bugles, ends with grunts, upright posture, ascending call	OBS;INF
Clip1	receiver: females, ears back, ignoring, paying attention very little to beginning but walk away, female walking away when male approaches, listening to bugle but not paying attention, slow-paced	OBS;INF
Clip3	sender: male herding, up to 8-9 females, male in middle, bugles, high-pitched, screams then grunts, head high, follows females, runs after 1 female, tail looks like it's up, head low, trotting, speeds up, gives one long squeal towards lone female, stops once female goes toward herd Pleading to female or fighting to keep female?	OBS;INF Q
Clip3	receiver: 8-9 females, walking away from male, ears back, slowly moving away, one female being chased, runs away from male and other females after male bugles, ears back, head up while running, turns & heads towards other females, ears moving, slowly stops to look & listen	OBS;INF

CODE	CATEGORY	DEFINITION	EXAMPLE
OBS	Observation	what I actually saw, heard, smelled, or otherwise sensed about the animal and its environment	in the forest, lone male raises nose in line with back, opens mouth and bugles
INF	Inference	what I (or others) think about what I observed; my underlying mental model	I think this is a young male because his antlers are small, and his call is relatively high pitched
Q	Question	what I'm curious to learn more about, to better understand what I observed; my hypothesis about cause/effect	I wonder if the presence of other males makes a difference in how often he calls
O	Other:	define:	

MAP FAQ SOURCES

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Date(s):	10/18/09
Duration (min):	~20

Q1 Brainstorming Initial Questions

STEP 1 Review your notes in O1. Think about what you do and do not know about this behavior. OPTION: Discuss your thoughts with others.

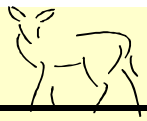
STEP 2 Brainstorm and write down as many questions as come to mind.

STEP 3 Read the categories at the bottom; in the far right column, write the code(s) that apply to what you wrote in the center column.

#	WHAT I AM CURIOUS ABOUT LEARNING	CODE
1	Does the male keep females in the herd as an advantage for more mates or to simply show his dominance?	FP
2	In the first clip, will the male force himself on the females or simply walk around bugling until one female shows interest?	HOW?
3	Are the females assessing the male based on his stance or just his bugles?	HOW?
4	Why are elks more high pitched than red deer in bugling? Does it have to do with altitude or habitat?	WHY? HOW?
5	What are the accepting gestures of the females?	FP

CODE	CATEGORY	DEFINITION	EXAMPLE
FP	Folk Psychology	Questions about beliefs, emotions, desires of the animal	Does he want to impress the females to stay with him?
HOW?	Proximate	Questions about the cause and development of behavior	How does the bull make that sound? Do young bulls sound the same as older bulls?
WHY?	Ultimate	Questions about the function and evolution of behavior	Why don't white-tailed deer bugle like elk? Are the females more likely to mate with a male that has a lower pitch bugle?

O	Other:	define:



Name: Danielle Minick
Date(s): 10/18/09
Duration (min): ~60

M1 Record Data (video/tape)

STEP 1 Find a place where you can watch deer and use a video cam to record behavior of a focal individual. This means keep the camera focused on one individual and follow it with the camera wherever it goes, for 3 minutes. OPTION: work with a partner who can write while you are using the video; check off behaviors you see on an ethogram list provided by the instructor.

STEP 2 Before starting, record information about your video by answering Q1- Q5.

STEP 3 Fill out the video log below. Use a new line for each clip.

Q1	What species will you watch (scientific & common name)?	Cervus elaphus, Red Deer
Q2	Where will you do observations (eg. Location, blind, vehicle)?	Fossil Rim W.C., Vehicle/blind
Q3	When (date and time)?	10/18/09 2-4 pm (1400-1600)
Q4	How (camera & partner)?	partner, JVC digital & Sony tape videos
Q5	What label will be used to identify these clips in the video archive that you will later analyze?	video clip #1: FR09 Red Deer Tape 4 15:01?
		video clip #2: FR09 Red Deer SD 3:14 pm

VIDEO LOG

#	START	GROUPS OF ANIMALS	NOTES ON BEHAVIORS AND CONTEXT
1	3:01	female red deer	grazing bout, moving, inactive-standing, savannah-like pastures, forested areas & hillsides, valley
2	3:14	male red deer, 4-5 female red deer, 3-4 females visible in clip, lying about 3+ body lengths away	cleaning, inactive-lying, licking, alertly listening, ear flicks, yawn, vehicle about 50 feet away, red deer in pasture included about 7-10 males present, about 30 females

MAP FAQ SOURCES

Name:	Danielle Minick
Date(s):	10/20/09
Duration (min):	~40

A1 Finding Scientific Sources

STEP 1 To answer your questions in Q1, use Google Scholar to search sources available to the general public; write the keyword you used for the search, and the reference of the source you found (e.g. web address, title, author, organization, publisher, date)

STEP 2 Search scientific sources using a library database (i.e. Web of Science); write the keyword and the complete reference (author, date, title, journal, volume, pages)

STEP 3 Categorize your sources in terms of reliability. Read the categories at the bottom; in the far right column, write the code(s) that apply.

Keyword	SOURCES I FOUND	Reliability Category
Red Deer Behavior & Ecology	Clutton-Brock, TH, Guinness, FE, Albon, SD. "Red Deer: Behavior and Ecology of two sexes." University of Chicago Press. 1982.	4****
Red Deer Behavior	Clutton-Brock, T.H., Albon, S.D. "The roaring of red deer and the evolution of honest advertisement." Behavior, 1979: pp 145-170.	5*****
female red deer assessment	Charlton, Benjamin D., Reby, David, McComb, Karen. "Female red deer prefer the roars of larger males." Biology Letters, 2007: 382-385.	5*****

CODE	CATEGORY	DESCRIPTION	EXAMPLE
1 *	unreliable	Tabloids designed to sell many copies to a mass audience interested in sensational stories	People magazine, National Enquirer
2 **	less than average	Popular magazines, books and videos marketing to a large market of the informed public	Whitecap Books, Penguin Books, Reader's Digest,
3 ***	intermediate	Science magazine articles written by journalists who specialize in interpretation of scientific information	Discovery, National Geographic, Smithsonian
4 ****	more than average	Invited books, textbooks and articles written by scientists but not peer reviewed	Scientific American, American Scientist, Voyageur Press
5 *****	most reliable	Peer reviewed scientific journal published by a society of professionals; peer-reviewed book	Animal Behaviour, Behaviour, Science, University of Chicago Press, Oxford Press

EVALUATION/FEEDBACK (optional to earn participation points)

1. What worked?

2. What did not work?

3. Suggestions?

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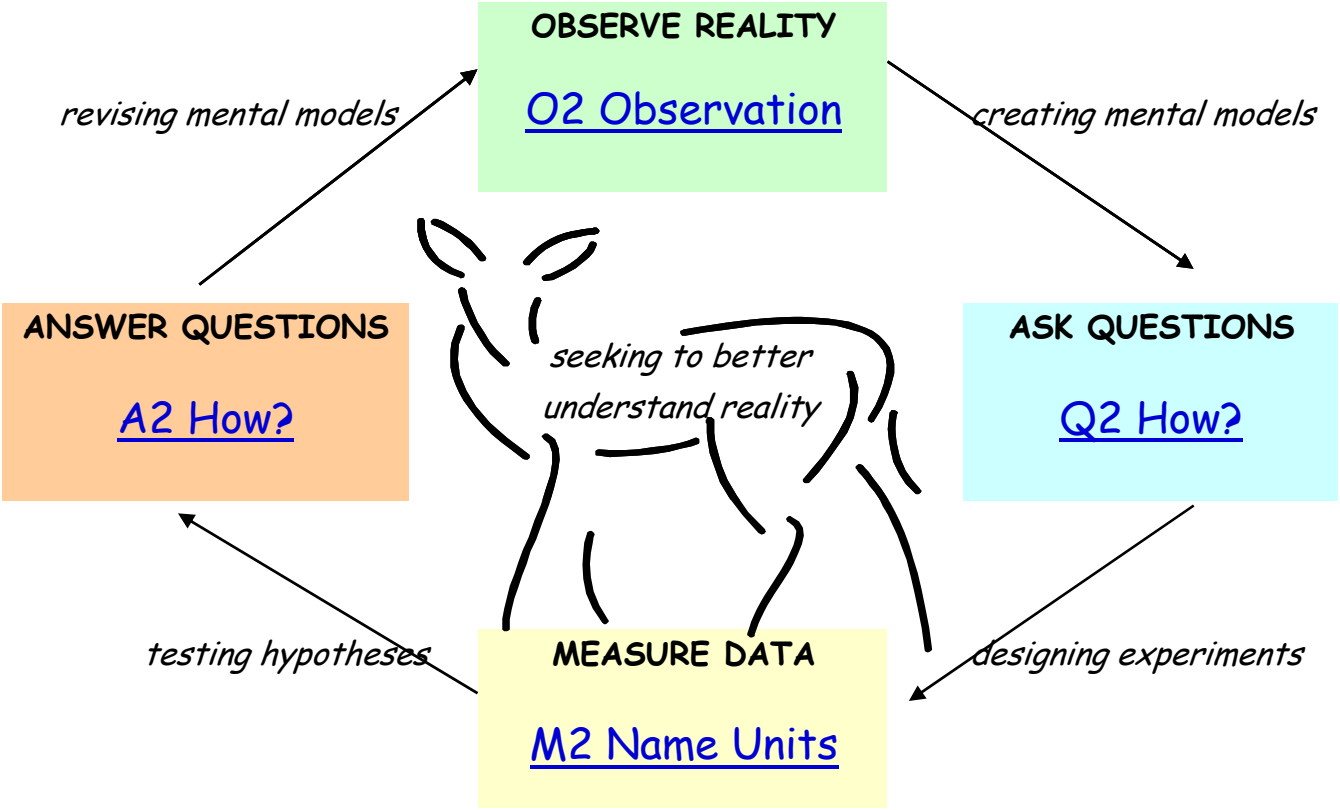
Module 2: Structure: Deer Behavior



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SPECIFIC OBJECTIVES FOR THIS MODULE IN THE INQUIRY CYCLE

2.1 Distinguish between cause and development perspectives used to identify testable proximate hypotheses about body language of deer.

2.2 Identify behavior units described as states and events in an ethogram for the species

2.3 Integrate information from observations and sources to present the evidence available to test proximate hypotheses about deer behavior.

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FAQ SOURCES

Name:	Danielle Minick
Date(s):	11/18/09
Duration (min):	~20

O2 Objective Observations- PROXIMATE

STEP 1 Practice thinking analytically like a scientist, by separating objective observations from subjective inference. Use the box at the bottom of this page to clarify proximate inference.

STEP 2 Watch your clip #1 from M1 and record your observations in the first white box. Repeat for #2.

STEP 3 Code what you wrote by inserting at the end of each sentence a code from the green box.

VIDEO	Observations (What did the animal do? Sense? Show?)	CODE
FR09 Red Deer Tape 4 15:01?	small female foraging while standing with head down, eating small pieces of grass at a time from the ground, very little movement at first, ears flicking, more movement with head down foraging, bright & sunny day, little windy, chewing and foraging continue, female stops to look up once to her left at unknown stimulus	STIM RESP CONT
FR09 Red Deer SD 3:14 pm	male laying down in shade, broken right antler, looking out to horizon, alert, licks air, starts to clean himself, more licking air after, ear flicks, big yawn with head high in the air followed by more licking, seems to be listening for something, alert, ears moving in different directions, still lying down, lowers head slightly, eyes close slightly, still looking out at horizon	STIM RESP

CODE	CATEGORY	DEFINITION	EXAMPLE
STIM	External stimulus	what the animal appeared to hear, smell, or otherwise sense about its environment	a "cow call" came from a man in camouflage, lying about 30 m uphill
RESP	Response	the animal's actions, including posture, movements, sounds, change in color or hair, etc.	male repeatedly raises the nose & makes a prolonged noise of high pitched, followed by low pitched grunts
INT	Internal state	indicators of hormonal, nutritional, age or other body condition; evidence of motivational state e.g. time since last meal	male has thick neck, rough neck hair; body is covered with mud as if it has been wallowing to cool down; large antlers;
CONT	External context	Other animals, plants, objects etc. around the animal	male is on the edge of a group of 12 females, in a grassy clearing in the evergreen forest
REW	Reward	external consequences that might shape the behavior by reward or punishment	after the bull shoves an intruding male, it leaves the group of cows
O	Other:	define:	

MAP FAQ SOURCES

Name:	Danielle Minick
Date(s):	11/18/09
Duration (min):	~25

Q2 Asking HOW? Questions- Hypotheses

STEP 1 Reread your observations in O2. Brainstorm about what questions come to mind about the CAUSE and DEVELOPMENT of behavior in individuals.

STEP 2 Practice rewording your questions about mechanisms in terms of testable hypotheses.

STEP 3 Code your questions in the right hand column, using the categories in the box at the bottom of this worksheet

#	HYPOTHESES ABOUT MECHANISMS OF BEHAVIOR	CODE
1	Does herding females provide an advantage to male elk? Those genotypes of male elk that herded more females were more likely to produce more viable offspring than those males that did not.	PD
2	Does the male wait until the females respond or does he charge the females? Those male genotypes that inspected the female before attempting copulation were more likely to mate with that female.	PC
3	How do the females assess the males? The male genotypes with the largest antlers and darker fur were more likely chosen by the females to mate than those that were not in a healthy condition.	PC
4	Why are elks more high pitched than red deer in bugling? For elk in high altitudes, a more high-pitched bugle travels farther and for red deer, a low-pitched bugle travels best in valleys and forests.	PD
5	How does a male know when to approach a female? The male genotypes that were more experienced, knew how to do a flehman and know the scent of a receptive female.	PC

CODE	CATEGORY	DEFINITION	EXAMPLE
PC	Cause	Questions about stimulus, response internal state and external rewards	Is a bull more likely to approach a cow if she answers his call?
PD	Development	Questions about how much a behavior is "fixed instinct" or "flexible learning", and how this changes as individuals mature with age	If elk calves were raised in Europe with red deer, would they roar like red deer?
O	Other: Ultimate	define: Questions about the function & evolution of behavior	

MAP FAQ SOURCES

Name:	Danielle Minick
Date(s):	11/18/09
Duration (min):	~80

M2 Name Behavior Units (Events & States)

STEP 1 Choose a video clip from M1/O2 and write the source information here:

STEP 2 Use reliable sources from A1 to make a list of behaviors for this species (i.e. an ethogram). OPTION: Use the ethogram provided by your instructor

STEP 3 Watch the clip. Write down the first behavior you see, using a name from the ethogram. Record the duration. Using the codes described in the box at the bottom of this page (or the ethogram), code this action as a state or event. Repeat.

Start	duration (mm:ss)	NAME OF BEHAVIOR	CODE
Time 0	00:34	Inactive standing	AS
00:34	00:05	Roaring/bugling	AS
01:10	00:01	lick	AE
01:11	00:02	Moving	AE
01:27	00:07	bugling/roaring	AS
01:54	00:01	lick	AE
02:08	00:24	sniff/lick	AS
02:34	00:05	tongue hanging	AS
02:40	00:01	lick	AE
02:41	00:21	Inactive standing	AS

CODE	CATEGORY	DEFINITION	EXAMPLE
AS	Activity State	A broad category of behavior that includes many specific actions associated with one motivational state (mood or goal); duration of minutes (e.g. an ongoing behavior you would time with a stopwatch)	resting, locomotion, foraging, interacting, maintenance (long duration, timed with a stopwatch in minutes & seconds)
AE	Action Event	Specific action patterns that are short in duration; subunits of an activity state; duration of seconds (e.g. a short action that you would count with a clicker, too brief to time)	step, turn, bite, lunge, call (short duration, counted with tally marks)

MAP FAQ SOURCES

Name:	Danielle Minick
Date(s):	11/12/09
Duration (min):	~35

A2 Answering HOW Questions

STEP 1 Search the sources you found in A1 to explore answers to the HOW questions on Q2. OPTION: use the link to background information provided by your instructor.

STEP 2 Focus on one behavior from M2 that you coded as an "action event". Read about it in your sources. Write the name of the behavior in the left column. Answer the Cause and Development questions for this behavior, refering to box at the bottom of this page and O2. Cite the source(s) in parentheses.

STEP 3 Repeat Step 2 for a behavior that you coded in M2 as an "activity state". Note that an activity state relates to an activated physiological system, so be specific about internal state.

STEP 4 Reread what you wrote. Decide what aspects are folk psychology, and edit the words fto state your idea in more scientific terms.

Behavior	CAUSE? (Source)	DEVELOPMENT? (Source)
EVENT Roar	context: presence of females, after chasing another male No apparent external stimulus, seems to be spontaneous	when male reaches maturity, high testosterone results in rutting behavior, young males learn not to roar in presence of older males, they male be chased (Clutton-Brock 1982)
STATE Rut	pheromones; ovulating females stimulus: photoperiod, influences testosterone cycles during fall; testosterone associated with antler & muscle growth; includes enter harem, bark, flehman, roar, chivy, lick rump, mount, dismount, harem hold, displace, chase, FIGHT, herd/drive, lick nose, pant, abduct, parallel walk, ejaculate, thrash	Rutting occurs seasonally, the length and shape of the larynx is highly heritable, some individual variation; during the fall season mainly, increases age and more experience (Clutton-Brock 1982)

CODE	CATEGORY	DEFINITION	EXAMPLE
PC	Cause	Answers about stimulus, response internal state and external rewards	Mature males in rut respond to the stimulus of female urine by sniffing it and lifting the lip (analagous to a snapshot w/telephoto lens)
PD	Development	Answers about how much a behavior is "fixed instinct" or "flexible learning", and how this changes as individuals mature with age	Young males ignore female urine, but as they reach puberty, they are much more likely to sniff the urine and follow the female (analogy of a video w/telephoto lens)
FP	Folk Psychology	Answers in terms of human-like beliefs, emotions, desires; including "for the benefit of the species", or "to spread his genes"	stags spar because they are testy during the rutting season and their tempers flare easily; bulls want to know if there is a cow in the area when they hear a call, and approach to see if she wants to mate

EVALUATION/FEEDBACK (optional to earn participation points)

1. What worked?

2. What did not work?

For O2, the code column is not specified. This should be fixed by labeling the column and adding a line to separate code from observations.

3. Suggestions?

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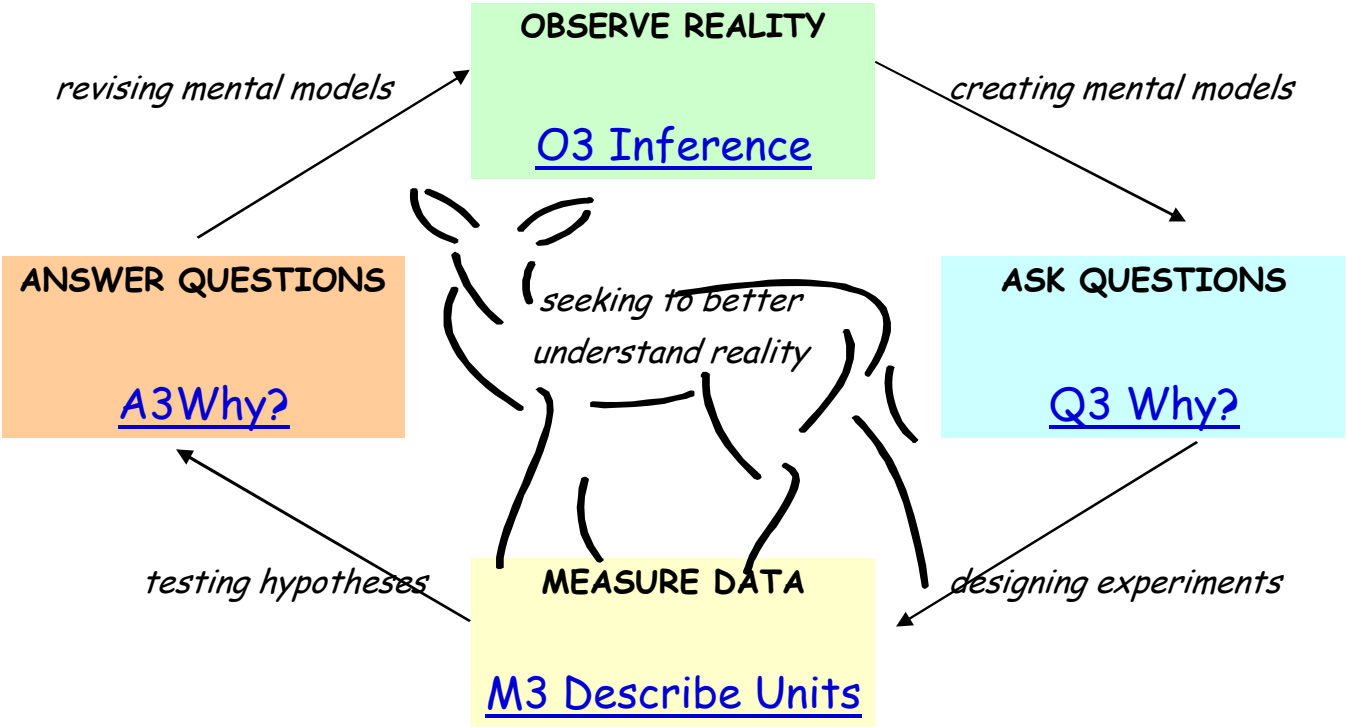
Module 3. Function: Deer Behavior



GENERAL LEARNING GOAL: Experience the nature of scientific inquiry (observation, measurements, asking and answering questions), as an alternative to folk psychology. Explain how each of these steps in the inquiry cycle relates to the others and helps us understand the science behind the myths of animal behavior. Explain how all inquiry involves these four steps; however, each person may choose to enter the cycle at a different place.

SPECIFIC OBJECTIVES FOR THIS MODULE IN THE INQUIRY CYCLE

3.1 Distinguish between function and evolution perspectives used to identify testable ultimate hypotheses about body language of deer.

3.2 Rank behavior units in terms of variability (fixed vs. flexible; instinct vs. learned)

3.3 Integrate information from observations and sources to present the evidence available to test ultimate hypotheses about deer behavior.

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MAP FAQ SOURCES

Name:	[redacted]
Date(s):	11/30/09
Duration (min):	

O3 Subjective Inference- ULTIMATE

STEP 1 Practice thinking intuitively like a scientist, by noting the consequences of behaviors and what this might mean for survival and reproduction of various genotypes. Refer to the table at the bottom of this page to clarify how the ultiimate perspective differs from proximate.

STEP 2 Review the same video clips that you used in O2. Write notes on what you observe and think about the consequences of the behavior in the short term and long term.

STEP 3 Reread your notes and add codes in parentheses at the end of each sentence, referring to the categories in the table at the end of this page.

VIDEO	CONSEQUENCES OF THE BEHAVIOR FOR THE GENE POOL	
FR09 Red Deer Tape 4 15:01?	female foraging, continuously eating while she can during the day, bright sunny day, continuously chewing and collecting grass, little movement, female must be hungry, collecting/eating large amounts of food to save and chew for later as a ruminant, more food eaten less possibility to starve	FP HOW?
FR09 Red Deer SD 3:14 pm	male red deer with broken right antler, inactively lying down, licking air possibly to moisten mouth to clean himself, male in rutting season and cleaning himself for female attraction? big yawn, continuously looking alert & listening, male watching over herd of females, ears moving, not falling asleep but resting, stays alert to keep female harem & keep other male's away	FP HOW?

CODE	CATEGORY	DEFINITION	EXAMPLE
FP	Folk Psychology	my explanation in terms of human-like beliefs, emotions, desires; including "for the benefit of the species", or "to spread his genes"	the bull wants to attract females and is angry at other bulls he believes will intrude on his harem
HOW?	Proximate	my hypothesis about the stimulus that elicits this response, the internal state of the animal and how much this varies among individuals as they mature	young males are more likely to approach females and avoid bigger males, when testosterone is high during the fall breeding season
WHY?	Ultimate	my hypothesis about the function in terms of survival and reproduction of distinct genotypes in a population; ancestral roots of the behavior based on comparing species that have diverged (or converged) over evolutionary time	those males with lower pitched calls are more likely to attract females at a distance in forests than males with higher pitched calls; the lower pitched roar of red deer diverged from elk during the glacial ages in more densely forested habitat

MAP FAQ SOURCES

Name:	Danielle Minick
Date(s):	12/3/09
Duration (min):	~10

Q3 Asking WHY? Questions- Hypotheses

STEP 1 Reread your observations in O3. Brainstorm about what questions come to mind about the FUNCTION and EVOLUTION of behavior in populations of species.

STEP 2 Practice rewriting your questions based on the logic that a scientist uses to develop hypotheses about why a behavior evolved.

STEP 3 Read the categories at the bottom; in the far right column, write all code(s) that apply to what you wrote in the center column.

#	HYPOTHESES ABOUT WHY BEHAVIOR EVOLVED	CODE
1	Do males always keep harems of females every rutting season or does this occur in older males only?	UF
2	Do female red deer forage most of the day or also at night?	UF
3	Is grooming in a male deer an attraction for females or simple cleaning?	UF
4	Do red deer live in more open grasslands during rutting season and dense forest when not rutting?	UE
5	Is male alertness a common characteristic in rutting males? Is it an instinct or is it learned?	UF

CODE	CATEGORY	DEFINITION	EXAMPLE
UE	Evolution	Questions about the evolutionary history of species (or populations); why ancestral roots of a behavior changed over time as species diverged (or converged)	Why do species that live in dense forests have lower pitched vocalizations than those that live in open grasslands?
UF	Function	Questions about which genotypes make more copies in the gene pool of a population	Do males with low pitched calls sire more offspring than males with high pitch calls?
O	Other:	define:	

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Name: Danielle Minick
Date(s): 12/03/09
Duration (min): ~20

M3 Describe Behavior Units

STEP 1 To answer your questions in Q3, choose 4 behaviors from M2 & A2 (2 activity states and 2 action events); enter the names in the appropriate box in the second column.

STEP 2 Describe the behavior in objective terms; strive to make a "word picture" that all observers on staff or a research team would recognize.

STEP 3 Read the categories at the bottom; in the far right column, rate the degree to each action is flexible (highly variable/learned/abnormal) or fixed (heritable instinct/individual stereotypy)

Category	NAME	OBJECTIVE DESCRIPTION (postures, movements, sounds, color changes, hair/feather changes)	VARIATION (5 is most variable)
State1	Grazing	foraging ground for grass, nibbling off pieces of grass & swallowing, searching for food, eating amounts of food in a grassland	4****
State 2	Cleaning	licking body area/parts to keep clean, moisten mouth to tidy fur by licking, removal of dirt and other unwanted material	3***
Event 1	Chew	movement of jaws up & down to grind food in mouth with their teeth, breaking down food into smaller pieces	1*
Event 2	Lick	movement of the tongue in a licking action, moistened, movement of tongue out of the mouth onto another surface	1*

CODE	CATEGORY	ACTIVITY STATE	ACTION EVENT
1 *	Fixed instinct	The sequence of action is the same every time and in every individual; duration may vary, e.g. prairie chicken courtship display	form and duration of the action is the same in all individuals and each time it is repeated, e.g. Firefly flash
2 **	Stereotypy	The sequence of actions is repeated, but only in abnormal individuals, as in a psychological or developmental disorder, e.g. pacing, cribbing	the unique action is repeated the same each time, but it is only in certain individuals, not a heritable trait of the species, e.g. head toss "tic"
3 ***	Modal	Intermediate between fixed and flexible, e.g. foraging	intermediate between fixed and flexible, e.g. sniffing
4 ****	Abnormal	Unusual and highly variable activity observed only in unique individuals, e.g. eating rocks	Unique movement shown only by one individual, with variations e.g. "floating limb"
5 *****	Flexible learning	A lot of variation in the form, duration, sequence, and diversity of actions across both individuals and times, e.g. tool using in chimps	Highly variable form and orientation of the behavior; change in frequency related to rewards, e.g. bottle-opening in great tits

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Date(s):	12/03/09
Duration (min):	~30

A3 Answering WHY Questions

STEP 1 Search the sources you found in A1 to explore answers to the WHY questions you wrote in Q3. Think about how the categories in M3 would influence your answers. OPTION: find additional sources to answer your questions

STEP 2 Focus on one behavior you named in M3. Find a similar behavior in your sources and compare similarities and differences between what you observed and what you read about it from your sources. Write the behavior in one cell of the left column. Repeat.

STEP 3 Write an hypothesis that would answer the question "Why does this behavior happen" from the perspective of FUNCTION. (Note your sources in parentheses)

STEP 4 Repeat Step 3 for this question "Why did this behavior change over the history of the species?" from the perspective of EVOLUTION.

Behavior	FUNCTION? (Source)	EVOLUTION? (Source)
Harem holding	males that keep more females in a harem were more likely to reproduce more, keeps other males away, increases fitness to harem hold females, increases chances of mating	larger males were more able to harem hold females, harem holding occurs in older males, establishes dominance, this behavior could have diverged from an ancestor and differs in different deer species
Grazing bout	Red deer graze a lot to put on weight before the winter season, deer that did more grazing were more likely to survive a hard/cold winter	with age grazing increases to support bigger bodies, this is a fixed instinct for survival and has evolved from ancestral forms of deer

CODE	CATEGORY	DEFINITION	EXAMPLE
UE	Evolution	Answers about the evolutionary history of species (or populations); why ancestral roots of a behavior changed over time as species diverged (or converged)	elk diverged from smaller bodied ancestors with changes in forest/grassland habitat during the ice ages; the larger body was associated with more resonant mating calls that carried a longer distance and male-defense of a group of cows (video w/wide-angle)
UF	Function	Answers about which genotypes make more copies in the gene pool of a population; differential fitness of the genotypes related to survival and reproduction	those genotypes that bugled were more likely to attract females and intimidate males than those that did not (snapshot w/wide-angle)
FP	Folk Psychology	Answers in terms of human-like beliefs, emotions, desires; including "for the benefit of the species", or "to spread his genes"	Bulls bugle because they want to spread their genes throughout the population. Contests among bulls are for the good of the species so only the best will breed

EVALUATION/FEEDBACK (optional to earn participation points)

1. What worked?

2. What did not work?

3. Suggestions?