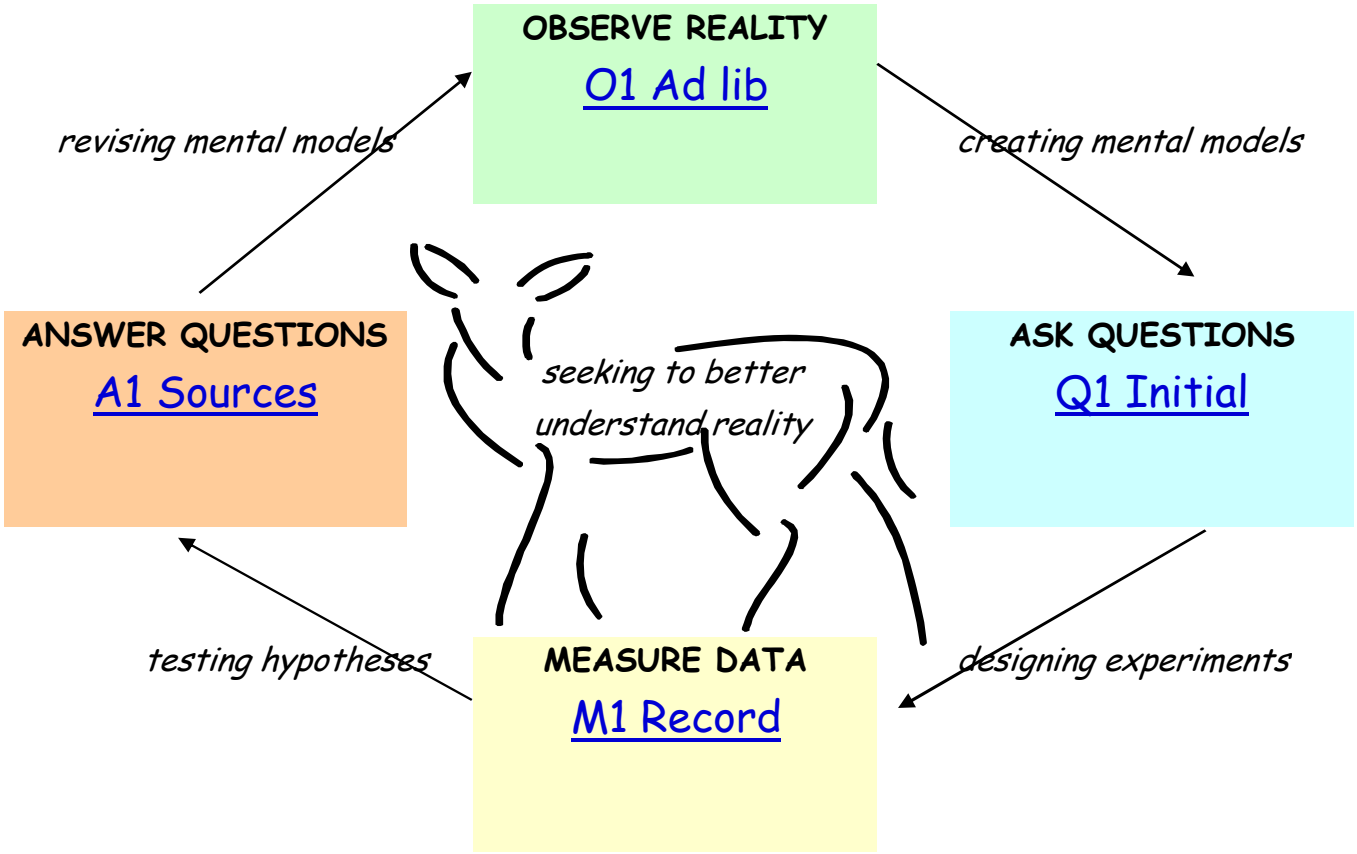
SCIENCE IN ACTION!

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:	Joey SanFilipo
Date(s):	12/5/09
Duration (min):	40 minutes

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:

http://www.youtube.com/watch?v=ve7ojHum9Mw&feature=PlayList&p=CDA5821B5261A1F9&index=6

Trevino, A. and SanFilipo, J. FR09 Red Deer 10/18 Clip 5. Fossil Rim Wildlife Center Ethology Field Trip, Glen Rose, TX. 10/18/09.

Code: FRdeerClip5

VIDEO CODE	AD LIBITUM NOTES ON WHAT I OBSERVED	ANALYSIS CODE
FRdeer Clip5	general notes about location, species, behavior & context: On a slightly windy day, a dominant Red Deer focal male is herding a few more females into a personal harem of about 30 females. The sun is shining brightly leading the females to lay and graze in the shade of the few sparse trees amidst this hillside savannah type setting. The focal male is bugling loudly with an erect penis in what seems to be a herding technique and a signal to express his increasing gonadal hormone levels. I think his increase of hormone levels may be in response to the possible release of pheromones by the grazing females.	OBS/INF

FRdeer Clip5	sender: (male red deer) The most direct form of communication observed in the clip was the bugling of the male deer. After this red deer stood bugling loudly with his neck outstretched and his penis erect, he began to herd a few more females into his harem.	OBS
FRdeer Clip5	receiver: (female red deer) As the bugling male continued to the side of his harem of females, I believe the females who were laying in the shade grazing were ignoring him. This could have been because of his consistent bugling over a long time period. This leads to the question; do the female's hormone levels lower in response to overwhelming (too consistent) amounts of bugling by the male?	INF/Q
Clip1 EthoWB Provided	sender: (male red deer) The bugling by this focal male also used an outstretched neck but the distance of filming limited the sight of whether the penis was erect also or not. He also walked as he bugled unlike the previous clip. I think the bugling here also was as/just before the male herded the females just like the previous clip.	OBS/INF
Clip1 EthoWB Provided	receiver: (female red deer) The females in this clip also seemed to respond in a similar way. For the most part, they ignored the bugle except to move in the direction the male was leading. However, this clip showed all the females standing/ walking as they ignored the male and the last couple seconds showed a female acknowledge the male bugling.	OBS

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

Name:	Joey Sanfilipo
Date(s):	12/5/09
Duration (min):	15 minutes

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.

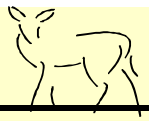
STEP 2 Brainstorm and write down as many questions as come to mind.

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	Like previously questioned in O1, does the level of consistency (too consistent) in bugling affect a female's hormonal response to the announcement of the male's increased hormones?	WHY?
2	Do the male's bugles express more information than the increase in hormone levels, like physical characteristics that say that male is the most dominant?	HOW?
3	When are pheromones released in these female red deer? Are they the immediate reasoning for a male's bugling or does he bugle initially in response to his own increase of hormones?	WHY?
4	Does bugling signal only a sexual response of the male or can it just be an announcement of territoriality?	HOW?
5	Are there different levels of bugling (different pitch, etc) that could mean something different besides younger vs. older males?	HOW?

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: Joey Sanfilippo
Date(s): 10/18/09 & 12/5/09
Duration (min): 15 minutes

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) European Red Deer
Q2	Where will you do observations (eg. Location, blind, vehicle)?	Fossil Rim Wildlife Center; vehicle: windowless bus
Q3	When (date and time)?	10/18/09 14:00-16:00
Q4	How (camera & partner)?	JVC and Sony brand camera used with Adrianna Trevino
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 10/18 2:34
		video clip #2: FR09 Red Deer 10/18 clip 5

VIDEO LOG

#	START	GROUPS OF ANIMALS	NOTES ON BEHAVIORS AND CONTEXT
1	14:34 (JVC)	Adolescent male European Red Deer along outer perimeter of a dominant male's territory containing about 4 deer (2 male, 2 female).	Male is laying in the middle of a grazing bout (chewing), then just as 4 zebra approach (within several yards) he discontinues his grazing and appears inactive (probably heard the approach). He then lifts his head and ears to face the zebra, then after watching for a few seconds he goes back to his grazing bout and lowers his ears.
2	15:10 (Sony)	Dominant focal male European Red Deer with several female red deer in a personal harem containing about 30 females.	Dominant male stands along the outer perimeter of his harem of females and begins to bugle loudly. When he stops bugling, he approaches another group of females outside his harem and begins to herd a couple more females into his harem. He then does this again by approaching another couple of females outside his harem and proceeds to herd them as well. The females all walk to his harem and begin laying and grazing under the shade of the trees ignoring his erect penis and occasional bugle.

MAP FAQ SOURCES

Name:	Joey Sankiewicz
Date(s):	12/5/09
Duration (min):	25 minutes

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
Roar, Red Deer	http://rspb.royalsocietypublishing.org/content/272/1566/941.full.pdf+html Reby,David, McComb, Karen, Cargnelutti, Bruno, Darwin, Chris, Fitch, W. Tecumseh, and Clutton-Brock, Tim. "Red Deer stags use formants as assessment cues during intrasexual agonistic interactions", The Royal Society, Royal Society Publishing, 2004.	5
Rutting Red Deer	Mysterud, Atle, Bonenfant, Christophe, Loe, Leif Egil, Langvatn, Rolf, Yoccoz, Nigel G., and Stenseth, Nils C. May 2008. "The timing of male reproductive effort relative to female ovulation in a capital breeder", Journal of Animal Ecology, 77:469-477.	5
Bugle, Red Deer	Reby, David, and Karen McComb. "Vocal Communication and Reproduction in Deer." Advances in the Study of Behavior. 33. (2003): 231-264.	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?

The application of our own questions and finding answers to them allowed me to feel like I was more involved with the inquiry. Usually, I try to rush through these assignments to find answers specific to the questions at hand, but this let me slow down and take my own curiosity to mind.

2. What did not work?

There were a few places that became confusing for me and I was not sure what exactly you were looking for in my response. For example, the sources were told to be placed in the boxes for A1 but the format was not clear of how you wanted us to type it. The parenthesis you put in the steps said what you were looking for but I was not sure if you wanted the information in that order or correct citing order. Also, the steps in A1 didn't mention if we needed to acknowledge which question from Q1 the sources were for.

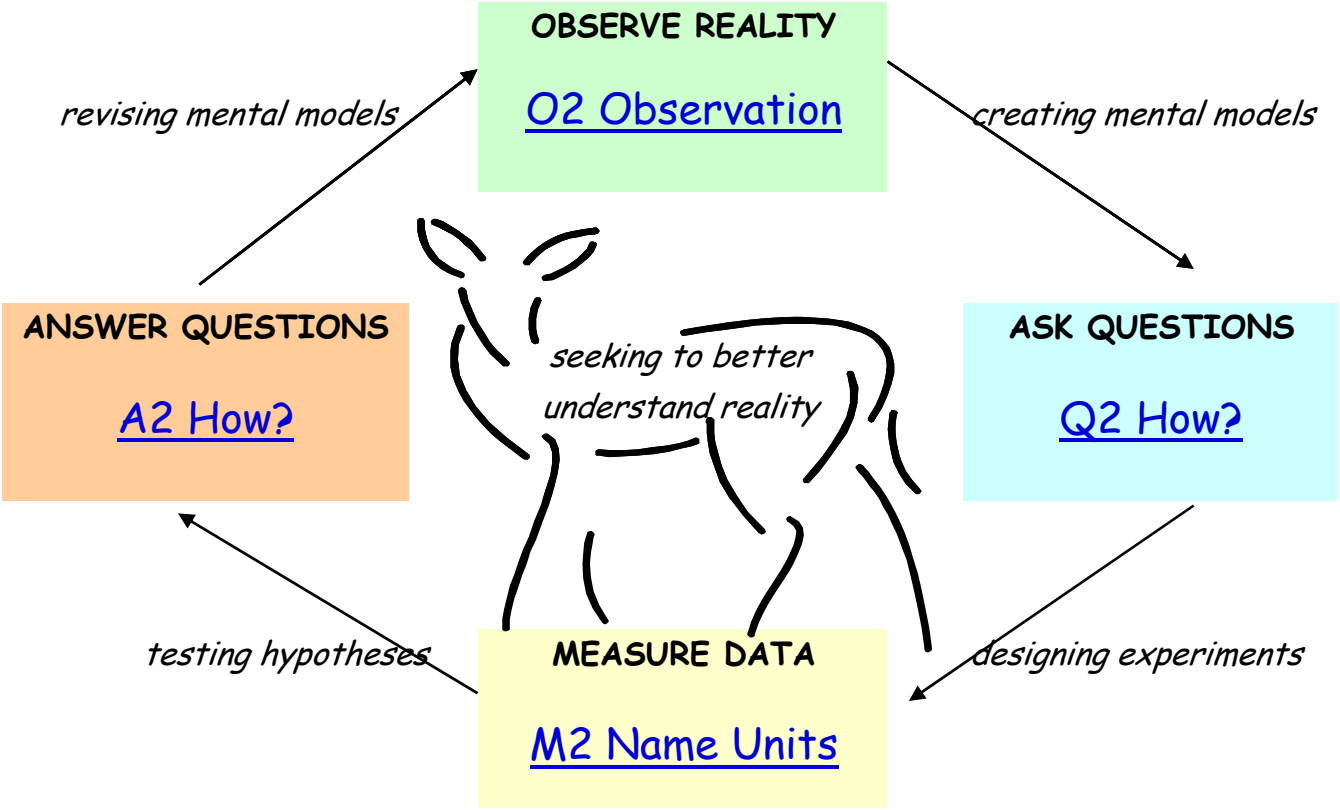
3. Suggestions?

Clarification of what is to be expected for the responses of A1. Maybe some leeway on those parts mentioned in "2".

SCIENCE IN ACTION!

Nature's Partners: predators, prey & you

Module 2: Structure: 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

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.

The information presented herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement is implied. Unless otherwise noted, information provided by this page does not represent the official views of Texas A&M University . Unless otherwise noted, the contents of this page are property of Dr. Jane Packard and the Technology Assisted Learning Lab at Texas A&M University. For technical assistance with this page contact theTechnology Assisted Learning Lab at (979) 862-3449, or via e-mail at prabha@neo.tamu.edu.

FAQ SOURCES

Name:	Joey SanFilippo
Date(s):	12/6/09
Duration (min):	30 minutes

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?)
#1 FRdeer Clip5	Dominant male stands with penis erect, head lowered using his strong throat muscles to emit a low pitched bellowing roar that changes pitch with a slight head lift to emit an intended bugle.(INT/RESP). The male in the midst of rutting, stood at the perimeter of his harem of about 30 females.(INT/CONT). With hormone levels increasing, the male began to herd more females to the harem.(INT). The male had a thick strong built body with a large antler rack (one broken) which may have shown the level of fitness of this bull.(INT). Our ethology field trip class watched from a distance of about 50 yards in a windowless bus as the male seemed "undisturbed" by our presence and the presence of other car driven observers within a similar radius.(CONT/STIM).
#2 Clip1 EthoWB Provided	Large stag begins bugling and walking tall to display his broad body with a thick neck and a large antler rack.(INT). The land below him is baron with spatially segregated grasses, shrubs, and dirt.(STIM). Females are herded by the male's bugling approach.(CONT/RESP). In his last "efforts" the male grunts in a low pitch to which a female turns her head in his direction.(RESP/CONT).

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:	Joey SanFilippo
Date(s):	12/6/09
Duration (min):	30 minutes

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.

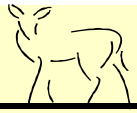
STEP 2 Practice rewording your questions about mechanisms in terms of testable hypotheses.

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	I hypothesize that the physiological features used to produce a bugle in red deer are utilized in the learning process of young bucks (observe and mimic older more successful males).	PD
2	I hypothesize the male will only bugle in the presence of more than 1 female.	PC
3	I hypothesize a bugle will only occur when a male has no stressors during breeding season.	PC
4	I hypothesize an orphaned young buck (just before becoming independent of his mother) will be unable to learn how to bugle with success (attract a mate) if he never finds a successful male to mimic.	PD
5	I hypothesize a calf's ability to utilize his bugling anatomical features at a stage of his development is instinctive (fixed) in his genes.	PD

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:	define:	

MAP FAQ SOURCES



Name:	Joey SanFilipo
Date(s):	12/6/09
Duration (min):	15 minutes

M2 Name Behavior Units (Events & States)

STEP 1 Choose a video clip from M1/O2 and write the source information here:
http://www.youtube.com/watch?v=ve7ojHum9Mw&feature=PlayList&p=CDA5821B5261A1F9&index=6
Trevino, A. and SanFilipo, J. FR09 Red Deer 10/18 Clip5. Fossil Rim Wildlife Center Ethology Field Trip, Glen Rose, TX. 10/18/09.

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	00:29	HERDING	AS
00:04	00:05	ROARING/BUGLING	AE
00:15	00:09	SNIFFING & LICKING	AE
00:43	00:37	LEAVING	AS
01:20	00:58	HERDING	AS
01:56	00:08	ROARING/BUGLING	AE
02:18	00:05	HAREM HOLDING	AS
02:23	00:21	HERDING	AS
02:44	00:03	ROARING/BUGLING	AE
02:47	00:13	HERDING	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:	xxxxxxxxxxxxxx
Date(s):	12/6/09
Duration (min):	50 minutes

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 Roaring/ Bugling	Breeding females respond to a mature male's stimulus of first initiated bouts, higher rates of, and constant roars while herding, by copulating with the male before any other males (McComb, 2003).(PC).	As a juvenile male red deer, the body size reduces the ability to roar more effectively (higher rates, etc. to gather/defend a harem) because of a reduced extension of his larynx (Reby, 2004).(PD).
STATE Herding	When mature males use herding with roars as a stimulus during "pre-rut", females tend to conceive earlier because of a response of advanced ovulation (McComb, 3003).(PC).	Male red deer tend to use more energy by walking more when herding multiple females to a harem during breeding season (Pepin, 2009), thus males who are greater fit (have genes that express greater energy efficiency) can withstand the energy loss from the breeding season. (PD). Pepin, Dominique, Morellet, Nicolas, and Goulard, Michel. "Seasonal and daily walking activity patterns of free-ranging adult red deer (Cervus elaphus) at the individual level", European Journal of Wildlife Research, (2009), 55:5, 479-486.

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?

Use of the same clips as in M1 were a great idea. This allowed us to continue our efforts of understanding/applying the knowledge needed to fully comprehend a more scientific approach. M2 was a great example since it applied a scientific aspect through an ethogram with our personal observations of those clips.

2. What did not work?

Small clarification errors were noticed just like in the first module. For example, O2 asked for the codes to be inserted after each sentence, but there was no mention of whether the sentence should only consist of one code per sentence. This is why my sentences sometimes had two codes because of comma segregated observations. Also, a small spelling error caught my attention in A2's last step ("...fto state...").

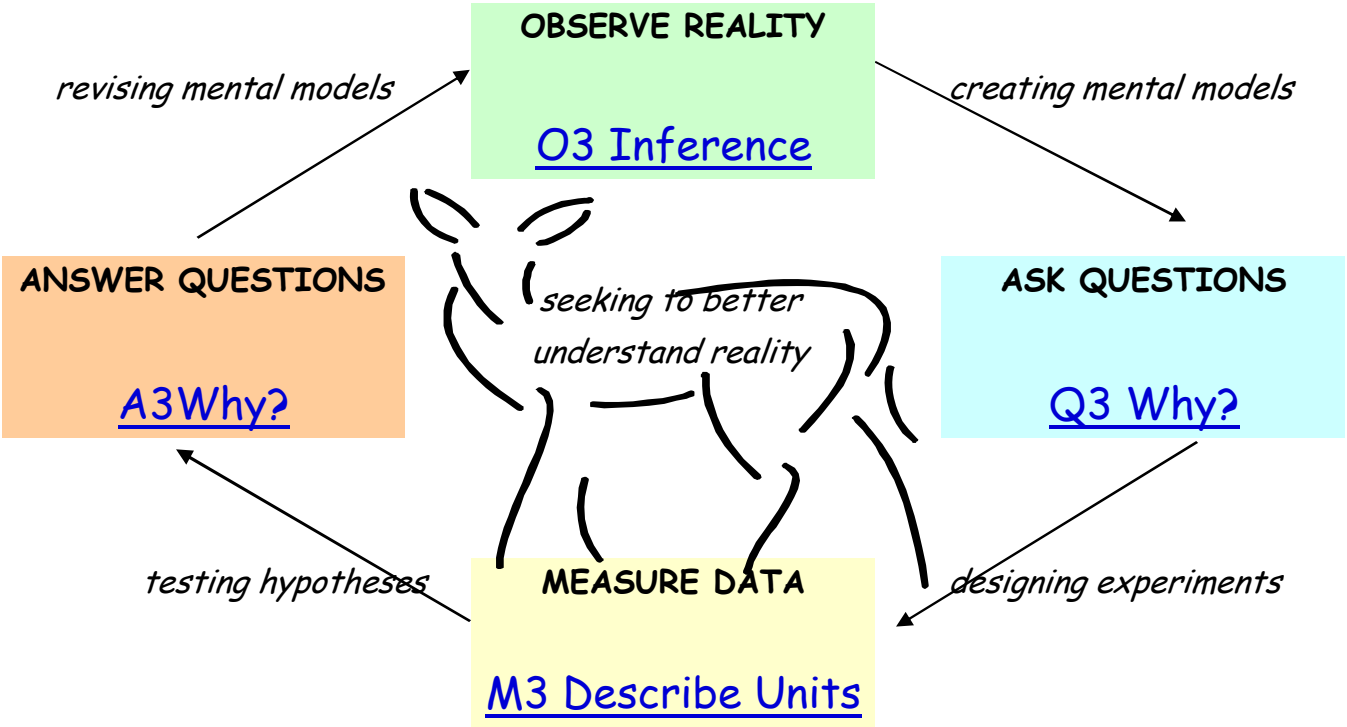
3. Suggestions?

Maybe to fix the clarification issue, include an extra addition in parenthesis of what your preferences are about in regards to the code situation (mentioned in "2"). Or/also be lenient in the grading of this area since there was not enough clarification. Lastly, to prevent the spelling error, be sure to check for the red underlined words in your pdf then fix what needs to be corrected.

SCIENCE IN ACTION!

Nature's Partners: predators, prey & you

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.

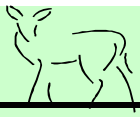
SPECIFIC OBJECTIVES FOR THIS MODULE IN THE INQUIRY CYCLE

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.

The information presented herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement is implied. Unless otherwise noted, information provided by this page does not represent the official views of Texas A&M University . Unless otherwise noted, the contents of this page are property of Dr. Jane Packard and the Technology Assisted Learning Lab at Texas A&M University. For technical assistance with this page contact theTechnology Assisted Learning Lab at (979) 862-3449, or via e-mail at prabha@neo.tamu.edu.



Name:	~~Joey Sanfilippo~~
Date(s):	12/8/09
Duration (min):	25 minutes

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
#1 FRdeer Clip5	The male's herding of the females into his harem can increase the chances of reproduction during breeding season by having multiple chances that one of the females are willing to breed.(WHY?). Males use their herding to drive females into a condensed harem with more solid surroundings (i.e. thick vegetation, cliff or mountain sides) can utilize their bugles to cover the entire harem increasing attraction and thusly reproductive success.(WHY?)
#2 Clip1 EthoWB Provided	Larger, older males have increased reproductive success because they have "fine tuned" bugle calls developed over their lifetime.(WHY?) Large males like this can attract more females with more consecutive bugles, resulting in a positive correlation between frequent calls and greater numbers of females.(HOW?). More frequent roars are positively correlated with larger, older more successful (attract more mates for reproduction) male red deer.(WHY?)

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:	Joey Sanfilippo
Date(s):	12/8/09
Duration (min):	35 minutes

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 with longer necks (used for longer larynx extension) produce greater fit offspring?	UF
2	Why do males herd multiple females into areas with more vegetation instead of less vegetable areas?	UE
3	Do females produce better fit offspring when they have no stressors during the breeding season (i.e. available, sustainable resources)?	UF
4	Why have red deer vocalizations increased in amount and variability instead of remaining constant during breeding season?	UE
5	Why do red deer males "condense" the area where harem holding occurs instead of using the same energy by walking to areas where females are located initially?	UE

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:	

Name: Joey Sanxxxpx
Date(s): 12/8/09
Duration (min): 35 minutes

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	Herding	Performed by a mature male during rut, he stands tall with his neck elongated, walks in direction of females then "counters" their movement to drive them to a harem. While driving on occasion, he lowers his head and extends his neck to produce consistent roars and grunts.	3
State 2	Harem Holding	During rut, a male will stand at or around his herd of females. He'll stand tall, displaying his features while protecting them from his competitors by chasing or fighting them away. He'll continue to roar and bugle to also display his fitness.	1
Event 1	Roaring & Bugling	A male will lower his head and elongate his neck to allow his larynx to fully extend to his sternum, then with air from his lungs and help from his muscular throat and diaphragm, he projects a variety of roars or bugles.	1
Event 2	Sniffing & Licking	With subtle movement of his nostrils, lips, and tongue, a deer will use his ol' factory senses to detect pheromones, and other distinctive smells. The deer may lower his nostrils to the host of the smell to "determine" information from that smell. It may lick it's lips or the air to regulate the senses or taste the air for pheromones, and other distinctive smells.	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

MAP FAQ SOURCES

Name:	Joey Sanfilippo
Date(s):	12/8/09
Duration (min):	45 minutes

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)
Bark	The deer who had the genotype for ability to bark were capable of defending one's territory and letting predators know they've been "spotted" (Reby, 2003).(UF).	All species of deer have been shown to share the same ability to bark just like their ancestors, but different frequencies of their bark vary from species to species (Reby, 2003).(UE).
Approach	The male deer who approached another male intruding his harem was more likely to defend his females by either fighting or "scaring" away the competitor male (Reby, 2004).(UF).	Approach is a very common behavior in multiple cervids, and can be associated with males who are attempting to intrude on another's harem resulting in various roaring bouts and/or fighting (Reby, 2003).(UE).

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?

The continued process of us creating our own questions/hypotheses. This allowed me to feel like I once again wasn't just typing answers down directly from sources but actually questioning the logic within the inquiry project. I also think the codes and examples at the bottom of each page was great, because it let the reader/student recognize the concepts he/she is working on to be better prepared for the final.

2. What did not work?

There was a little confusion in A3 at step 2, and I was unsure if this was an actual typed response we should have put down. I understood why it was good to compare the similar behaviors, but resorted to just thinking through this step instead of typing it down somewhere on the page.

3. Suggestions?

To fix the confusion of A3, maybe add step 2 as just another sentence on step 1 and let the reader/student know that the similarities and differences do not need to be typed anywhere on the page.