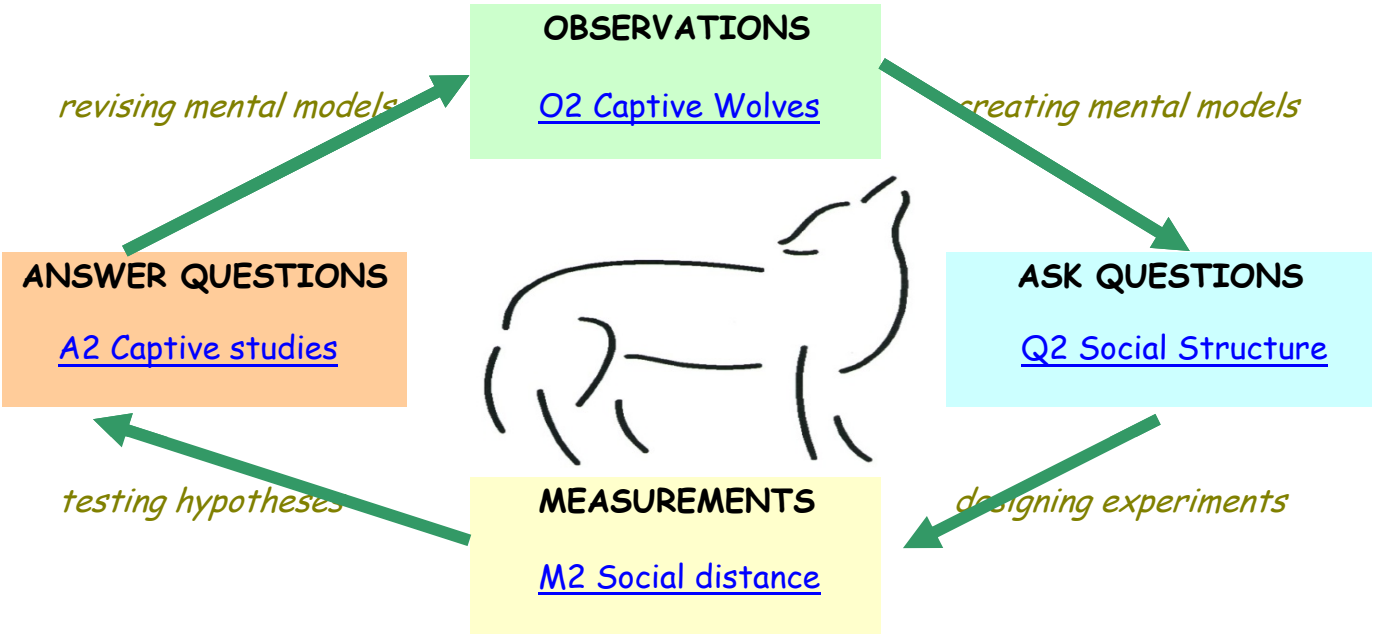
SCIENCE IN ACTION!

Nature's Partners: predators, prey & you

Wolf Inquiry Activity

Module 2. Wolf Family Partnerships



GENERAL LEARNING GOAL: Experience the nature of scientific inquiry

SPECIFIC OBJECTIVES FOR MODULE 2

2.1 Distinguish between observation and inference in identifying testable hypotheses about body language and social structure in captive wolves.

2.2 Measure "social distance" to test hypotheses about how body language is related to social structure.

2.3 Evaluate the evidence to decide how body language is correlated with social structure in captive wolf families.

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O2 Captive wolves- closeness within a family

STEP 1 Choose two video clips about a captive wolf family, which show body language related to sharing space. When you make your choice, consider whether you have sufficient information about the social structure of the wolf family in each video. In the column "VIDEO". Write the source information for each video in a separate box (bright green). **SAVE**. *OPTIONS: Use links to background information (clips 10-13); a video, webcam or camcorder at a zoo.*

STEP 2 Observe the first video clip and write general notes on what happened in the box provided (white). Focus on the body language that influences social distance among each member of the group. Repeat for the second video clip. **SAVE**.

STEP 3 Evaluate your notes from Step 2, to distinguish among observation (fact), inference (interpretation) and questions (see box below). Annotate your notes: underline observations; place quotes around inferences; and insert question marks. **SAVE**.

VIDEO	GENERAL NOTES ON WHAT HAPPENED

CODE	CATEGORY	DEFINITION	EXAMPLE
under-line	**Observation** (direct evidence)	what I actually saw, heard, smelled, or otherwise sensed about the animal and its environment	one wolf snarled and lunged at the other when it started mounting a third wolf
"quotes"	**Inference** (indirect evidence)	what I (or others) think about what I observed; my underlying mental model	I think the Alpha male was defending his mate from a subordinate
?	**Question**	what I'm curious to learn more about, to better understand what I observed; my hypothesis about cause/effect	I wonder how long these males have known each other, and if the Beta male is trying to take over the position of the Alpha male.

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Q2 Social structure and courtship

STEP 1 Discuss your notes about the captive wolf packs you observed in the video for O2. Think about the reproductive behavior of dogs and wolves in terms of the Nature/Nurture debate about what aspects of courtship behaviors are instinct and what aspects are learned. If you need more information, links are provided on the Module 2 webpage and background information. Answer questions #1 & #2 below. **SAV**E

STEP 2 Discuss what you have learned about the relation between social structure and courtship in captive wolf packs from your experience, observations, and readings. Answer Question #3. **SAVE**. *OPTION: Interview a dog breeder or biologist to hear their ideas about instinct and learning.*

STEP 3 Use your mental model to write one testable hypotheses about how social structure affects courtship in captive wolf packs. Discuss what evidence you would need to test your hypothesis. Answer Question #4. **SAVE** *OPTION: Compare your hypothesis with others in your group, discuss how the different evidence might be needed to test each hypothesis.*

Question 1: What are your questions about SIMILARITIES in courting behavior of captive dogs and wolves, which might give us clues as to what is instinctive?

My answer:

Question 2: What questions do you have about DIFFERENCES in courting behavior of captive dogs and wolves, which might be clues as to how instinct is modified by learning?

My answer:

Question 3: What is your mental model of how instinct and learning interact by influencing the courtship behavior of captive wolves?

My answer:

Question 4: **How does social structure (as measured by social distance) relate to mating in captive wolves?**

Alternative Hypotheses	Hypothesis	Evidence I would need to test my hypothesis
Example	I hypothesize that only the genetically most aggressive wolves are close enough to be the breeders.	(1) individuals at the bottom of the ladder court those at the top, (2) aggression is not genetic because individuals move up and down the ladder after fights
My hypothesis:		

EXAMPLES: SOCIAL STRUCTURE AS MEASURED BY SOCIAL DISTANCE

CHART A: "LADDER MODEL"

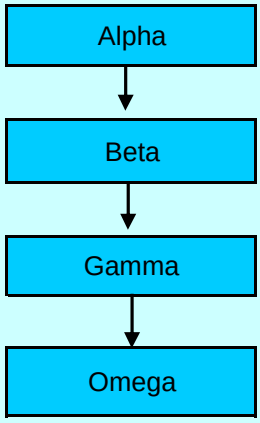


CHART B: "BRANCHED MODEL"

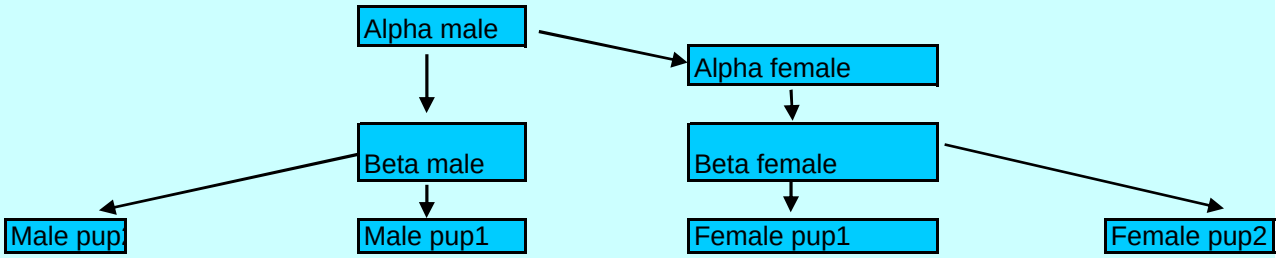
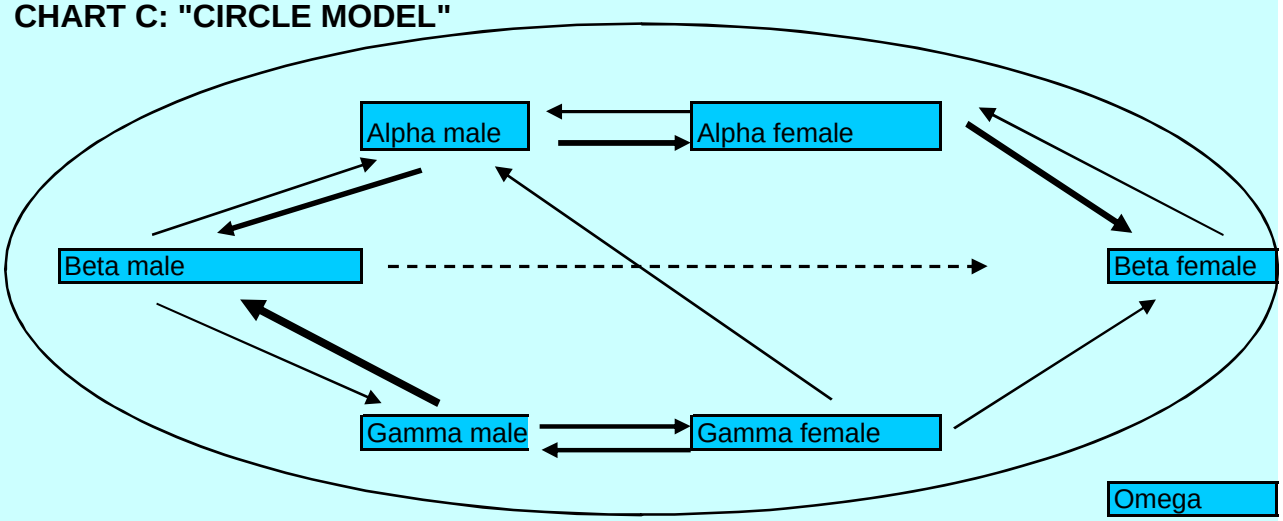


CHART C: "CIRCLE MODEL"



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M2 MEASURING SOCIAL DISTANCE

STEP 1 Choose a video clip about 2 minutes long and identify the wolves. For example, in clip 12 "Alpha male - Shewano" is grey and holds his tail high, "Alpha female- Denali" is black and holds her tail high, "Beta-Bridget" is grey/black and holds her tail low, "Gamma-Shiskoyu" is grey and has a low tail posture. *OPTION: Discuss as a group which names best match each wolf in the video, and their identifying features.*

STEP 2 In the first frame of the video estimate the distance between the Alpha male and the other 3 wolves you named; write the numbers in the first row of the table *TIP: measure the distance in terms of body lengths, using the examples at the bottom of this page. If a wolf is out of view, write "3".*

STEP 3 Play the video for 30 seconds and stop it; estimate the distances between the Alpha Male and each of the other 3 named wolves; write the distances between wolves in the next empty row of the table

STEP 4 Repeat Step 3 at 30 second intervals until all the white boxes on the table are full of numbers; Answer Questions A-C at the bottom of the page.

Time counter	**ALPHA MALE- ALPHA FEMALE**	**ALPHA MALE- BETA WOLF**	**ALPHA MALE- GAMMA WOLF**
0 sec			
30 sec			
60 sec			
90 sec			
120 sec			
Average	#DIV/0!	#DIV/0!	#DIV/0!

Question A:	**What was the average distance between Alpha Male and Alpha Female?**	**What was the average distance between Alpha Male and Beta?**	**What was the average distance between Alpha Male and Gamma?**
Average:			

Question B: **Which wolves had the highest and lowest average distance from the Alpha male?**

My answer:

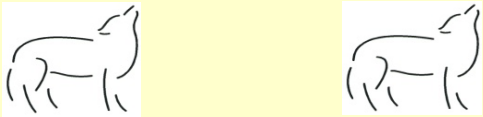
Question C:	**Based on this evidence, can you reject your hypothesis from worksheet Q2 as "not a good model" (explain)?**
My answer:	

EXAMPLES:

What is the distance between these two wolves, in wolf-body-lengths?

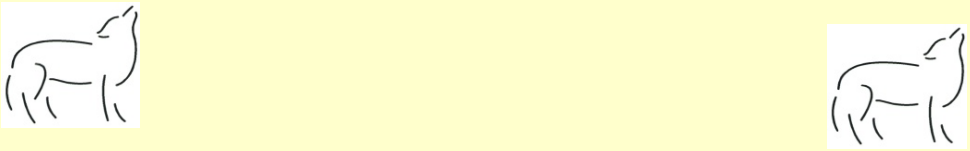
Answer: 1

TIP: write "1" if the distance is 1 body length or less,



Answer: 2

TIP: write "2" If the distance is greater than 1 and less than 3 body lengths



Answer: 3

TIP: write "3" If the other wolf is 3 or more body lengths (or out of view)

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A2 Captive studies- social distance and courtship

STEP 1 Unfortunately, many of the myths about wolf behavior are based on studies of wolves in a captive environment. Scientists debate whether this is valid information, when generalized to wolf behavior in the wild. Choose a source to read about captive wolf behavior, which relates to your questions about social distance and courtship (refer to your Q2 activity notes). Answer Question #1. **SAVE**. *OPTION: Use materials provided, links on the background information page, or search on scholar.google.com. Divide into groups and report on your source to your group.*

STEP 2 Read your source and paraphrase what the author said, using your own words. This should be informative enough so that another student can decide if your source is credible and addresses the question. Answer Questions #2-3. **SAVE**. *OPTIONS: Read your answer to the class and discuss. Play charades and act out the behavior to see if other groups can guess.*

STEP 3 Analyze what was instinctive and what was learned courtship behavior in the source you read. Determine which statements in your source were more Folk Psychology than science. Answer questions #4-5. **SAVE.** *OPTIONS: Report your findings to your collaborative learning group. Discuss similarities and differences between several sources. Go back and update your answer to Question 3, as needed.*

STEP 4 Synthesize information from your sources and your observations. Discuss how discarded hypotheses might linger on as myths in the popular literature. Apply what you have learned to answer the brain teaser in Question #6. **SAVE.** *OPTION: Discuss your ideas with others in your collaborative learning group.*

Question 1: **What is your source of information about how social distance relates to courtship in captiv wolves?**

My source:

Question 2: **In your own words, what information from this source was relevant to the question of how social distance relates to courtship in captive wolves?**

My source said:

Question 3: **How credible was this source in terms of scientific content? Why?**

My answer:

Question 4:	**How does social distance influence courtship in captive wolves (Q2), based on a synthesis of what you learned from your source (A2) and your measurements (M2)?**
My inference (educated guess):	

Question 5:	**When wolves do not participate in courtship within a group, how much is this due to instinc and how much is due to learned social distance?**			
		Mostly instinct	**Both instinct and learned**	**Mostly learned**
	These are the aspects of courtship behavior that fit in each of the categories (instinct/learning)			

Question 6:	**Does the courtship behavior of dogs differ from wolves due to instinct (changes in genetic blueprint) or learning (changes in environment)? How does the evidence support your answer?**
My inference:	

CONCEPT	DEFINITION	EXAMPLE
instinct (nature)	Behaviors that are coded primarily by information in the genotype, relatively resistant to change due to individual experience.	Males in breeding condition are attracted to the pheromone odors of females during the ovulatory phase of the reproductive cycle.
learning (nurture)	Behaviors that are modified by experience due to individuals' interactions with the environment in terms of positive and negative rewards	Males that are not in breeding condition learn to stay away from those that are, after conflict erupts when they come too close to the ovulating female (negative reinforcement).
Analyze	Identify cause and effect interactions using a reductionist left brain thinking style; draw interactions between causal mechanisms and consequences as boxes and arrows in a systems chart.	The consequence of male/male conflict is temporary social suppression of courtship behavior in the individual that is hurt the most.
Apply	Considering the analysis of one system, make a prediction for another similar system; change the words in the boxes of a systems chart.	Conflict results in social suppression of courtship in stable family groups of wolves, but not in the fluctuating groups of strange dogs attracted to follow a female in heat running through the neighborhood.

EVALUATION (optional to earn participation points)

What worked?	
What didn't work?	
Sugges-tions?	