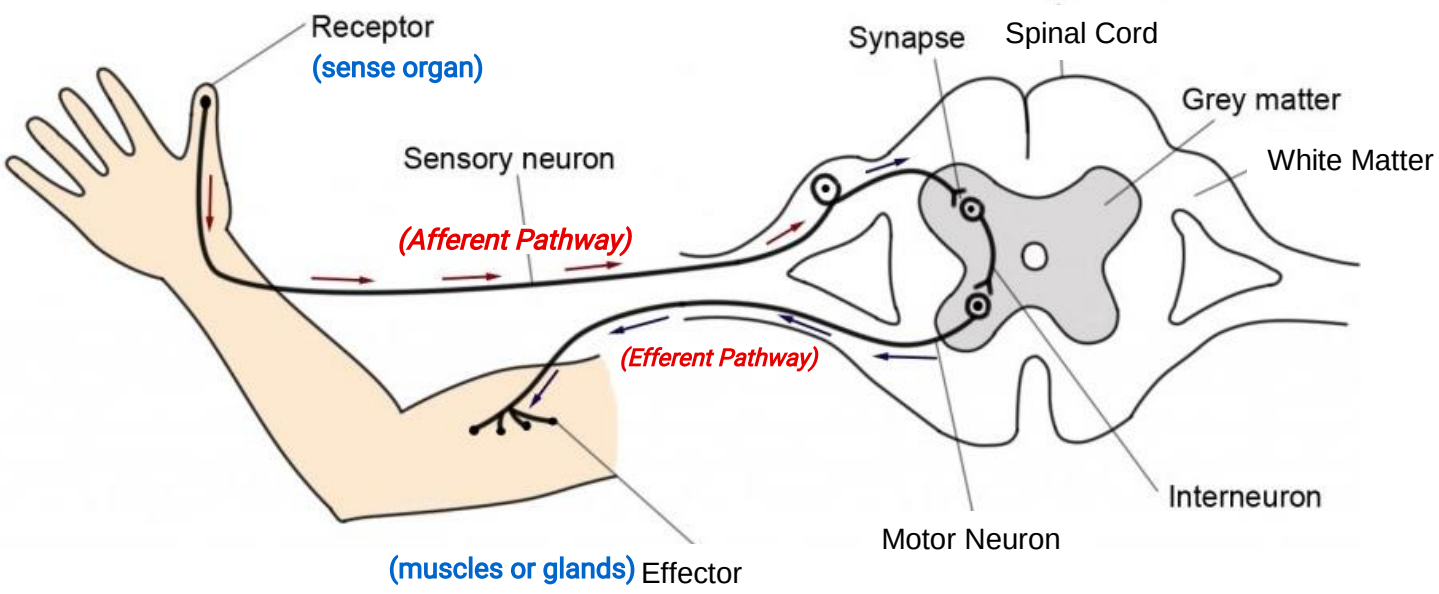
(Animation: Sumanas - Reflex Arc) (Animation: Reflex Arc) (Patella Reflex)

A Simple Reflex Arc



Structure	Function
Receptor	Detects stimuli (*any change in the environment*).
Sensory Neuron	Relays impulses (*action potentials/messages*) from receptors TO the Central Nervous System = Spinal Cord and brain.
Synapse	Tiny gap (*space/cleft*) between neurons.
Spinal Cord	Relays impulses (*action potentials/messages*) to and from the brain.
Grey Matter	Nerve tissue that contains UNmyelinated neurons.
White Matter *(myelin = fat)*	Nerve tissue that contains myelinated neurons.
Interneuron	Relays impulses (*action potentials/messages*) from a sensory to a motor neuron.
Motor Neuron	Relays impulses (*action potentials/messages*) the Central Nervous System (*Spinal Cord and brain*) to an effector (*muscle or gland*).
Effector	Muscle (*or gland*) that carries out a response.

biologist

(p.1122) **1.** How do behavioral ~~ecologists~~ define **behavior**?

Behavioral biologist define behavior as what an animal does and how it does it.
How an organism DETECTS and RESPONDS to stimuli (*any change in the environment*)

* Nature vs. Nurture *

(p.1122) **2.** What influences behavior more: genes or the environment?
(nature) *(nurture)*

Behavior is a combination of influences from both gene AND the environment.
(Gene and nongenetic environmental factors "build on each other.")

(instinctive)

(p.1123-24) **3.** Define and give three examples of and **innate** behaviors.

Innate behavior refers to behavior that is developmentally fixed; all individuals exhibit virtually the same behavior despite the inevitable environmental differences within and outside their bodies during development and throughout life - occurs naturally in all members of a species - no learning or prior experience required.
Examples if innate behaviors include:
(1) newly hatched birds begging for food by raising their heads
(2) a Kittiwakes (gull) aversion to cliff edges
(3) in humans, many reflexes are considered innate or instinctive: suckling response in newborns is an example.

(p.1124-25) **4.** What is the relationship between a **fixed action pattern** (FAP) and a **sign stimulus**?

A fixed action pattern (FAP) is a sequence of behavioral acts that is essentially unchangeable and usually carried out to completion once initiated. Fixed Action Patterns are triggered by an external stimulus known as a sign stimulus.

(Video: Niko Tinbergen's Experiment - Three-Spined Stickleback - Sign Stimulus)

(Video: Niko Tinbergen - egg rolling behavior of the Greylag Goose - Fixed Action Pattern.)

(p.1125) **5.** Briefly describe Niko Tinbergen's experiment on **innate behavior** using stickleback fish.

Tinbergen undertook an experiment with male sticklebacks. This species of fish is very territorial and aggressive. In the mating season they develop a red spot on their underside. Tinbergen observed that at this time male sticklebacks will attack another male stickleback with a red spot that enters their territory but will not attack if a red spot is NOT present.

(Video: Behavior of the three-spined stickleback fish)

(p.1126) **6.** What is **behavioral ecology**?

Behavioral Ecology is the research field that views behavior as an evolutionary adaptation to the natural ecological conditions of animal - *the study of the evolutionary basis for animal behavior due to ecological pressures.*

(p.1128) **7.** What is **learning**?

Learning is the modification of behavior resulting from specific experiences.
(change for the better)

(p.1128-29) **8.** How do the alarm calls of vervet monkeys provide an example of how animals improve a behavior by means of **learning**?

The vervet monkey has 3 distinct alarm calls depending on the predator which elicits a specific response. They run up a tree when they hear the alarm call for a leopard, look up when hearing the alarm call for an eagle and look down when hearing the alarm call for a snake. Young vervet monkeys are able to "fine tune" their calls with assistance by the entire group.

(p.1129) **9.** Define **habituation** and explain how it helps the overall fitness of an organism.

Habituation is a very simple type of learning that involves the loss of responsiveness to a stimuli that convey little or no information. This helps the overall fitness of an organism by allowing its nervous system to focus on stimuli that signal food, mates, or real danger instead of wasting time or energy on a vast number of other stimuli that are irrelevant to the animal's survival and reproduction.

(p.1130) **10.** Briefly describe Konrad Lorenz's **imprinting** experiment using graylag geese being sure to use the term **sensitive period** in your answer.

Konrad Lorenz found that geese totally isolated from any moving objects during the first two days after hatching, which for geese is the sensitive period for imprinting on parents, failed to imprint on anything afterwards.
A sensitive period is the limited time in an animal's development when learning of particular behaviors can take place.

(Animation: What is Imprinting?)

(Video: Konrad Lorenz Experiment with Geese)

(Video:Konrad Lorenz - Imprinting)

(p.1132) **11.** Briefly describe Ivan Pavlov's **classical conditioning experiment** using dogs.

Ivan Pavlov's classical conditioning experiment was concerned with the proximate causes of associative learning, *the ability of many animal to associate one stimulus with another*. A type of associative learning called classical conditioning *involves learning to associate an arbitrary stimulus (ringing a bell) with a reward or punishment*. Pavlov sprayed powered meat into dog's mouths, causing them to salivate. however, just before spraying, he exposed to dogs to a sound (*bell ringing*). Eventually, the dogs salivated in response to the sound alone, which they learned to associate with the normal stimulus.

Office Video

(Ted-Ed: The Difference Between Classical and Operant Conditioning)

(p.1132) **12.** What is the difference between **classical conditioning** and **operant conditioning**?

Classical conditioning involves learning to associate an arbitrary stimulus with a reward or punishment while operant conditioning (trial-and-error learning) is when an animal learns (to modify behavior based upon passed experiences) to associates one of its own behaviors with a reward or punishment and then tends to repeat (reward) or avoid (punishment) that behavior. Operant conditioning is the basis for most animal training in which the trainer typically encourages a behavior by punishing (shock collar/electric dog fence) or rewarding the animal (with praise or food) until the animal performs the behavior on command without the punishment or reward.

(The Big Bang Theory - Sheldon Trains Penny with Positive Reinforcement)

(animal-related)

(p.1134) **13.** Compare and contrast and give specific examples of **kinesis** and **taxis.**

Kinesis and taxis are both simple mechanisms of movement in response to a stimulus (*change in environment*), however, kinesis is a simple change in activity in response to a stimulus while taxis is a more or less automatic, orientated movement towards (+) or away (-) from some stimulus.
An example of kinesis is sow bugs becoming more active in dry areas and less active in moist areas a simple behavior that tends to keep the organism in moist areas. An example of taxis is how housefly larvae automatically move away (- phototaxis) from light thus avoiding detection by predators.

(p.1143) **14.** What are **phermones** and give three examples of pheromone use by animals.

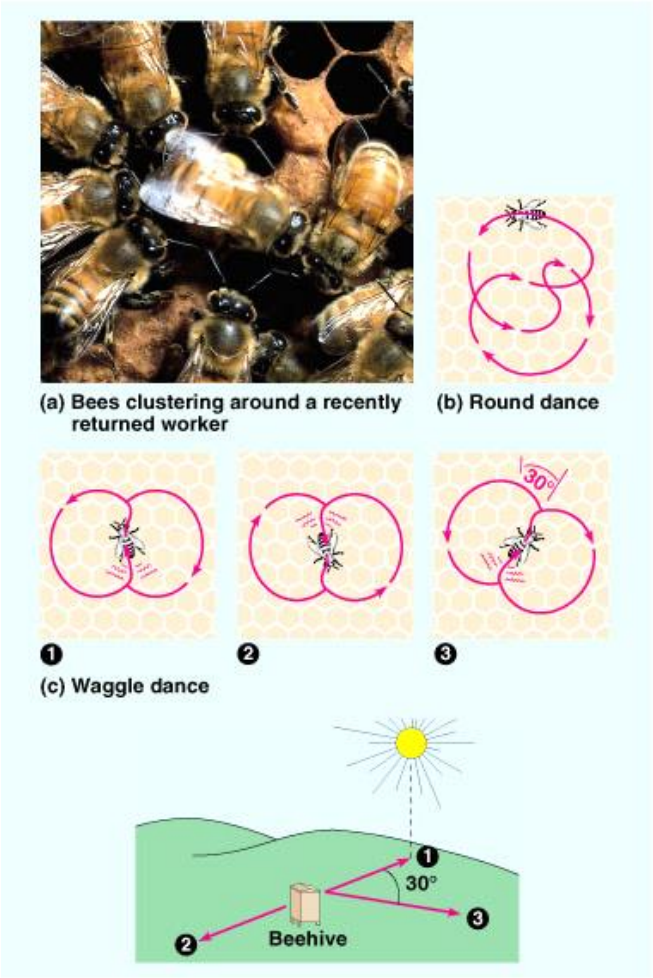
Phermones are odors or air-borne chemical messages that allow animals to communicate.
Three examples of phermones include:
(1) Female silkworm moths emit chemicals that can attract a male from miles away.
(2) Ants release scents that guide other ants to a food source.
(3) Queen honeybees release a scent that attract male honeybees or drones.
(4) Female dogs in heat or estrous, release a pheromone called methyl p-hydroxybenzoate that has shown to attract and sexually arouse male dogs that pick up that scent.

(Animation: Bee Dance Language)

15. Use the diagram below to explain how honeybees communicate information about the location of sources of food.

(a) Worker bees cluster around one of their sisters, recently returned from a foraging trip. (b) The round dance indicates that food is near but may provide no information on directionality or specific distance. (c) The waggle dance is performed and, according to von Frisch's hypothesis, indicates both the distance from and direction of the food source.
(1) If the straight run is directed upward, this signals that the food is in the same direction of the sun.
(2) If the straight run is directed downward, this signals that the food is in the opposite direction of the sun.
(3) If the angle is 30^{o} to the right of vertical, the food is 30^{o} to the right of the horizontal direction of the sun.

During the waggle dance, the bee also regurgitates nectar so other bees with "know" what type of food to seek.



(BBC Video -The Waggle Dance)