Learning

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What is Learning?

- **<u>Learning</u>** – any relatively permanent change in behavior brought about by experience or practice
  - When people learn, some part of their brain is physically changed to record what they have learned.
  - Any kind of change in the way an organism *<u>behaves</u>* is learning.

An instantaneous learning experience.

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Learning VS. Innate Behaviors

- **Reflexes** – motor or neural reactions to specific stimuli in the environment

- **Instincts** – innate behaviors that are triggered by a broader range of events, such as aging and the change of seasons

- Both reflexes and instincts help an organism to adapt to its environment and do not have to be learned.

Pavlov & Classical Conditioning

- **Ivan Pavlov** – Russian physiologist (person who studies the workings of the body) who discovered classical conditioning through his work on digestion in dogs

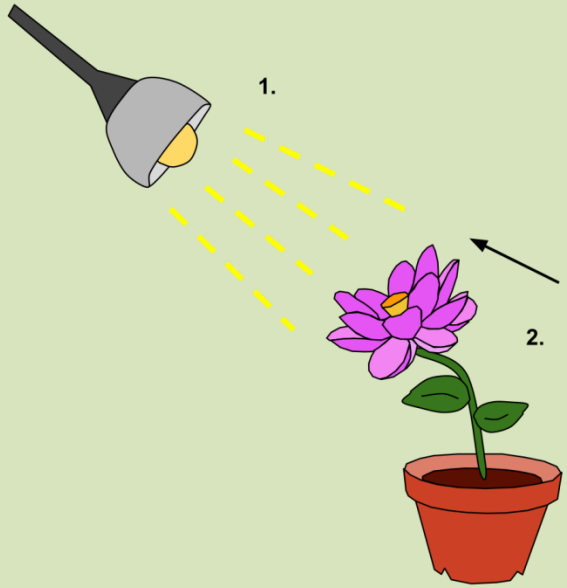
- **Classical conditioning** – learning that involves the association of two stimuli

Classical Conditioning Concepts

- **Stimulus**: anything that causes a reaction to occur
- **Response**: the reaction to a stimulus

- **Unconditioned**: unlearned, naturally occurring
- **Conditioned**: learned

- **Neutral**: no effect



Classical Conditioning Concepts

- **<u>Unconditioned stimulus (UCS)</u>** - a naturally occurring stimulus that leads to an involuntary response
- **<u>Unconditioned response (UCR)</u>** - an involuntary response to a naturally occurring or unconditioned stimulus
- *Example: Trina screamed after being pricked with a pin.* (no learning necessary)

Classical Conditioning Concepts

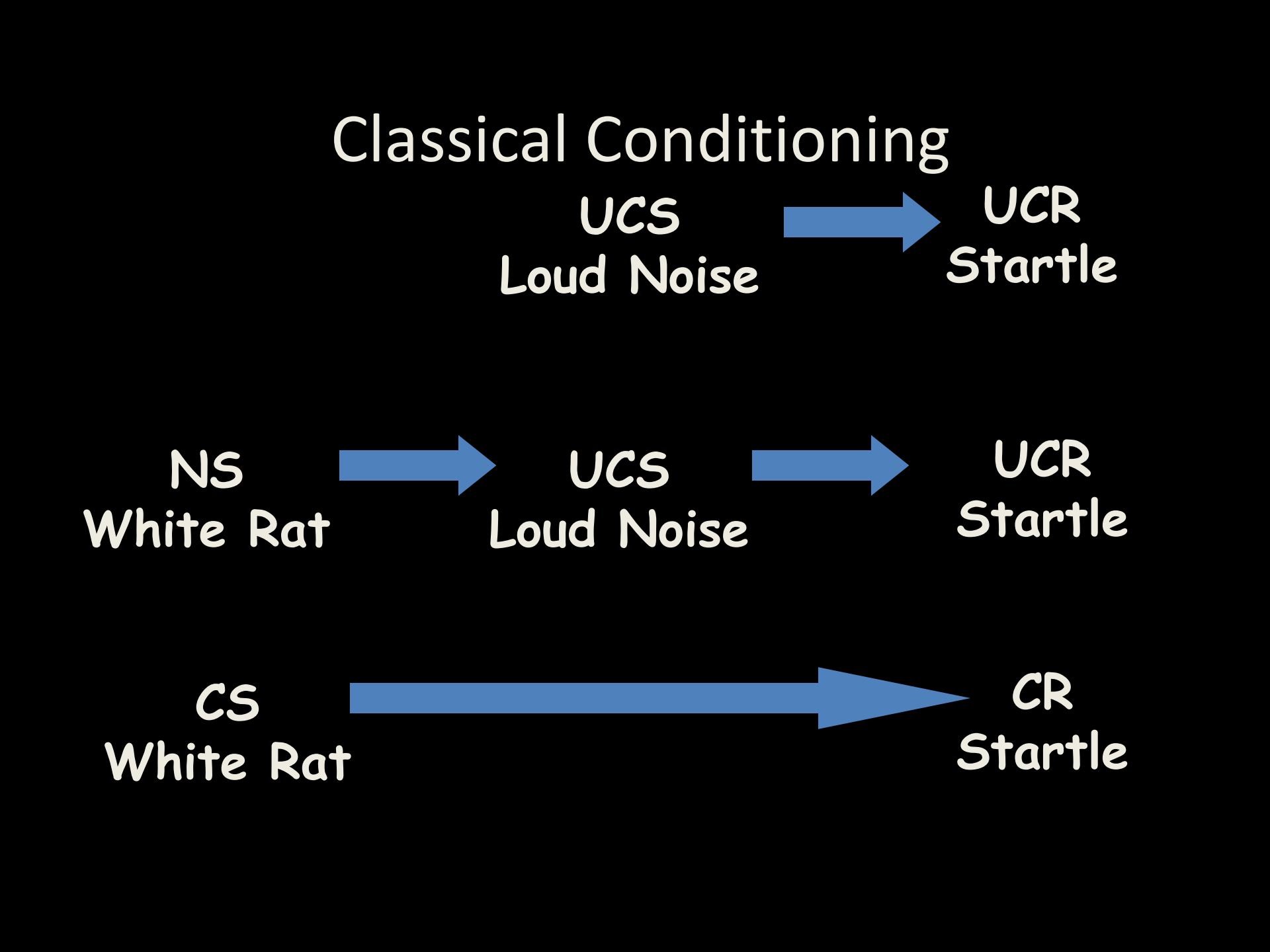
- **<u>Conditioned stimulus (CS)</u>** - stimulus that becomes able to produce a learned reflex response by being paired with the original unconditioned stimulus
- **<u>Conditioned response (CR)</u>** - learned reflex response to a conditioned stimulus

CS – ice cream truck

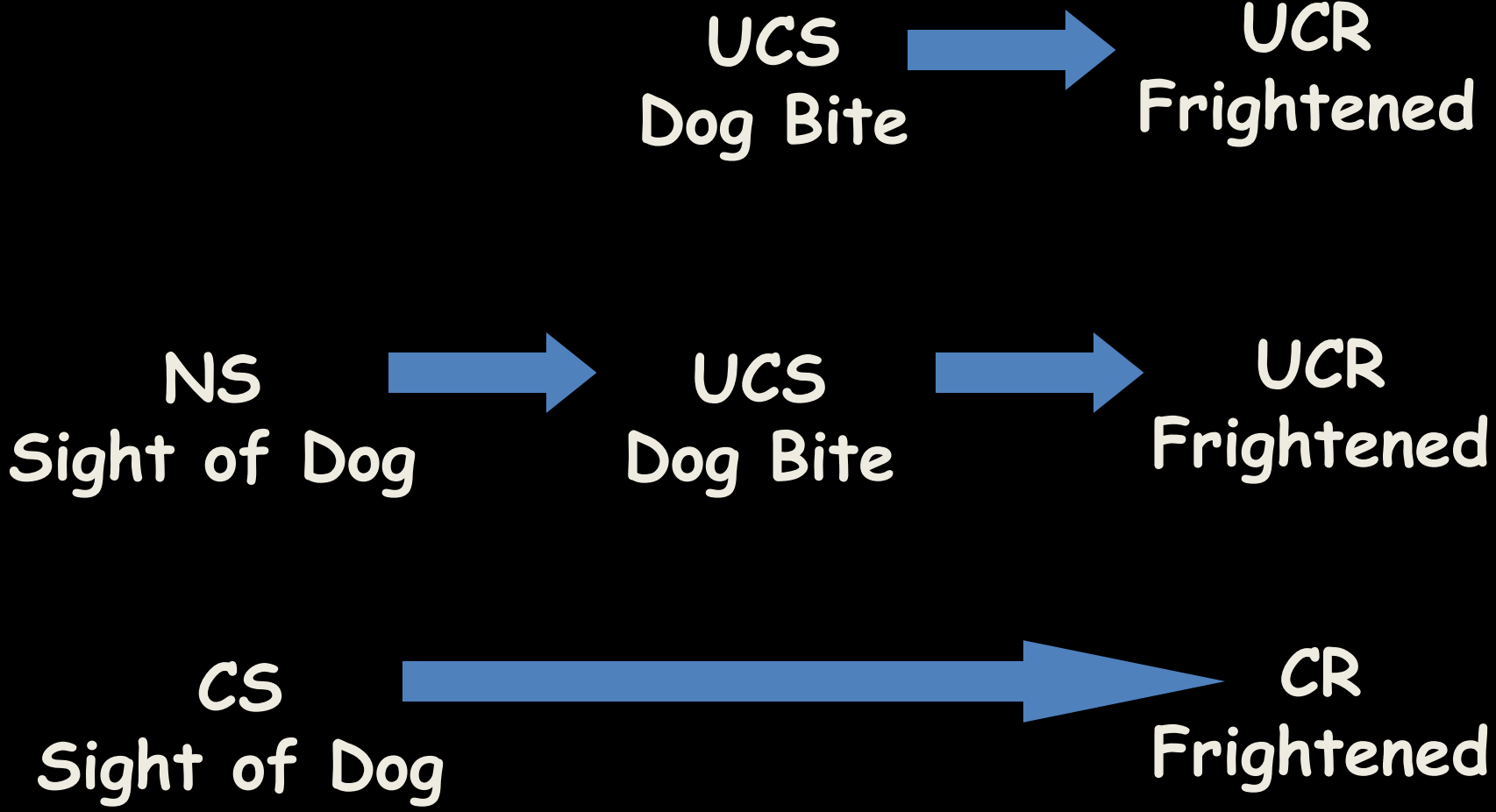
CR – salivation when hear ice cream truck bell

- *Example: Malcom salivated at the sound of the ice cream truck bell.* ("associative learning" has occurred)

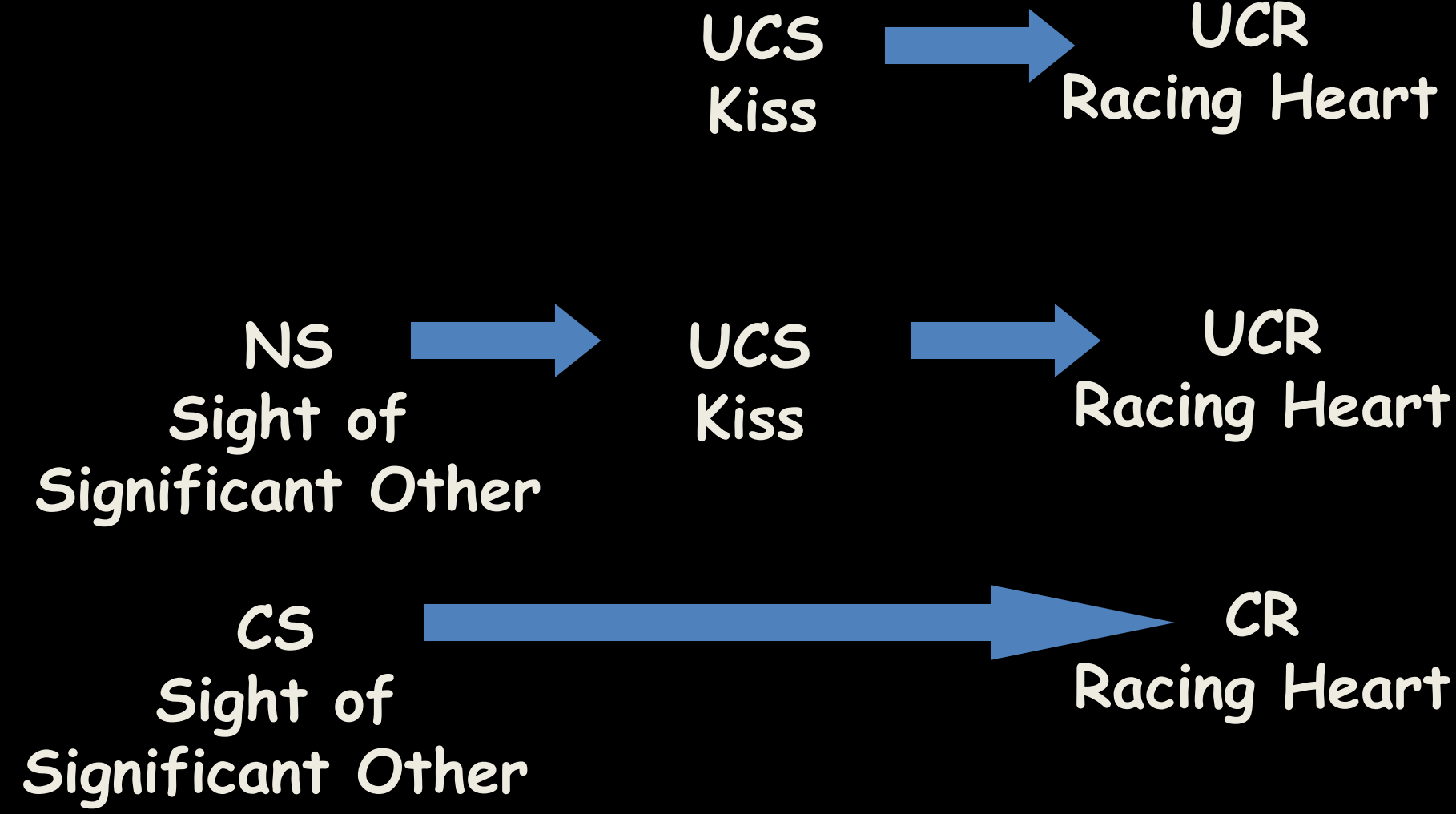
Classical Conditioning



Classical Conditioning



Classical Conditioning



Pavlov's experiment

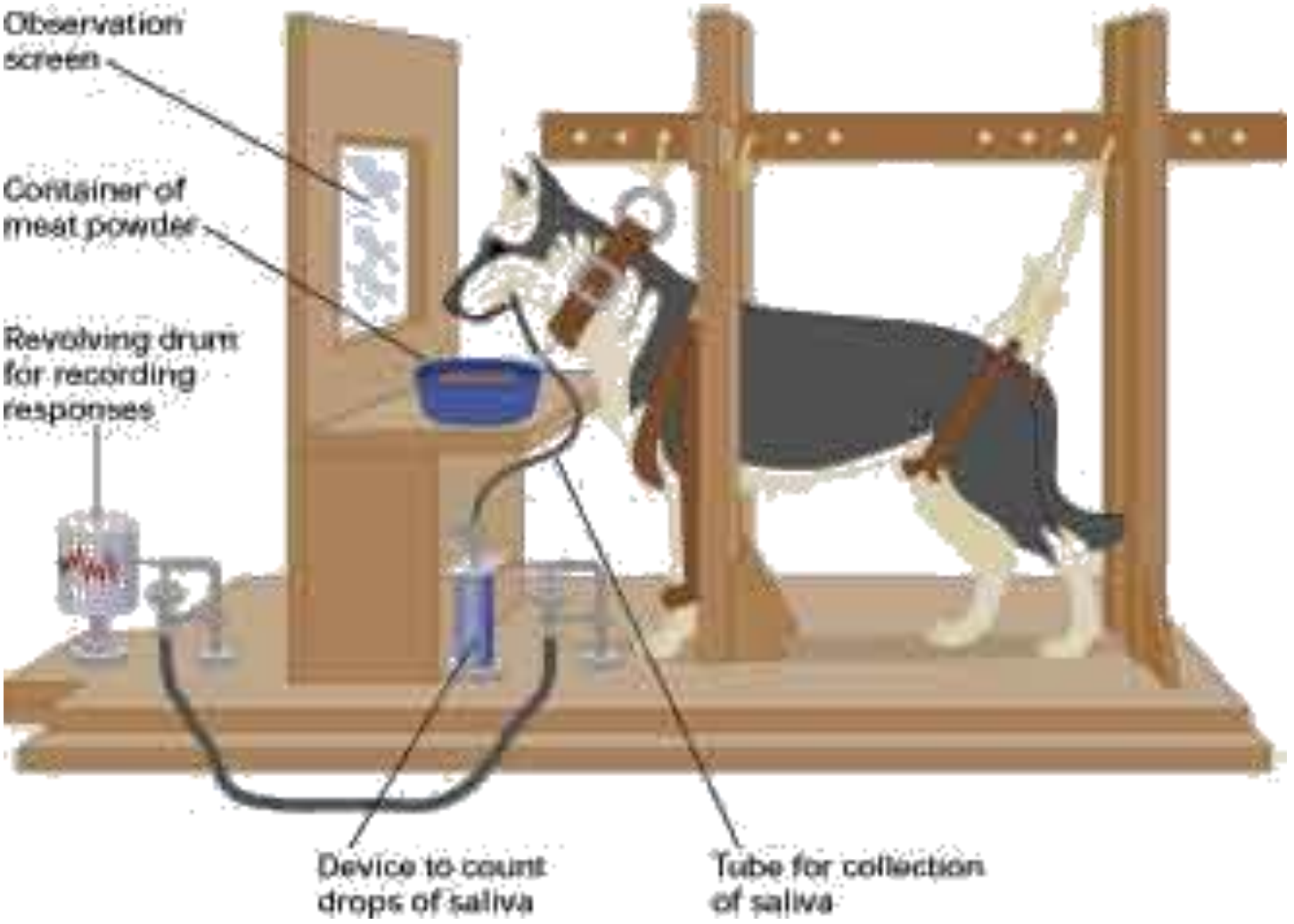
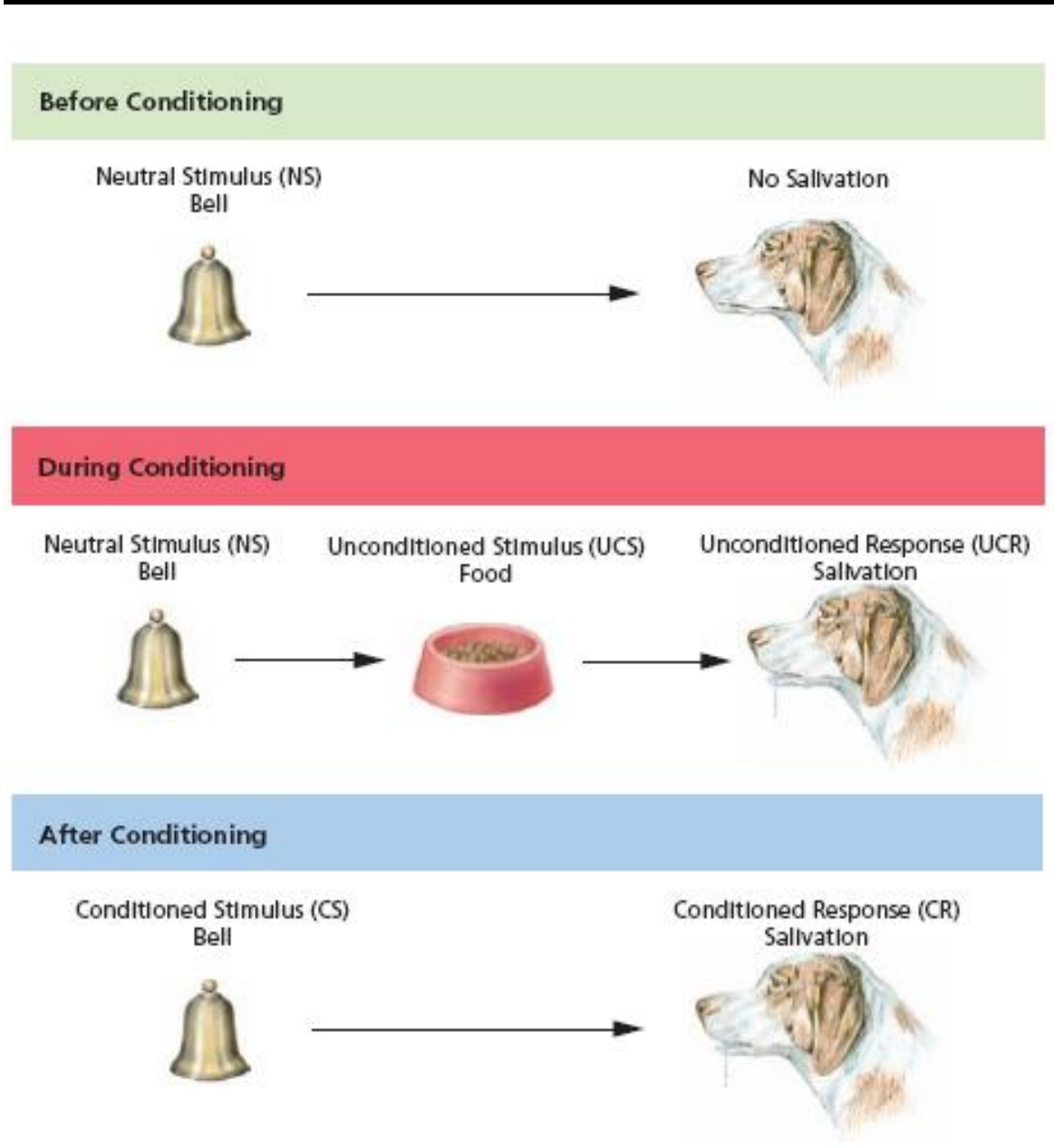


FIGURE 5.1 **Classical Conditioning**
Before conditioning takes place, the sound of the bell does not cause salivation and is a neutral stimulus, or NS. During conditioning, the sound of the bell occurs just before the presentation of the food (the UCS). The food causes salivation, the UCR. When conditioning has occurred after several pairings of the bell with the food, the bell will begin to elicit a salivation response from the dog without any food. This is learning, and the sound of the bell is now a CS and the salivation to the bell is the CR.



Acquisition - the repeated pairing of the NS and the UCS;
the organism is in the process of acquiring learning.

Classical Conditioning Concepts

Although classical conditioning happens quite easily, there are a few basic principles that researchers have discovered:

1. The NS must come *before* the UCS.

2. During the period of "acquisition"—time during which the learning takes place, the NS and UCS must come very close together in time—ideally, only several seconds apart.

3. The NS must be paired with the UCS several times, often many times, before conditioning can take place.

4. The CS is usually some stimulus that is distinctive or stands out from other competing stimuli.

Classical Conditioning Concepts

- **Extinction** - the disappearance or weakening of a learned response following the removal or absence of the unconditioned stimulus (in classical conditioning)
  - *Example: Alexander became less afraid of his doctor once he stopped receiving shots.*

- **Spontaneous recovery** – the reappearance of a learned response after extinction has occurred
  - *Example: After six months of not seeing his doctor, Alexander returned only to find that he was afraid of him again.*

Classical Conditioning Concepts

- **Stimulus generalization** - the tendency to respond to a stimulus that is only similar to the original conditioned stimulus with the conditioned response
  - *Example: Jermaine screamed when he saw a shrub that looked like a dog from far away.*

- **Stimulus discrimination** - the tendency to stop making a generalized response to a stimulus that is similar to the original conditioned stimulus because the similar stimulus is never paired with the unconditioned stimulus
  - *Example: After realizing that the white bunny was different than the white rat, Little Albert stopped startling when he saw the white bunny.*

John B. Watson and Classical Conditioning

- Watson believed that human behavior, just like animal behavior, is primarily the result of conditioned responses. He proposed that just as reflexes can be conditioned (as proven by Ivan Pavlov), so can human emotions, such as fear.
- Watson, along with graduate student, Rosalie Rayner, demonstrated through their experiments with a baby called Little Albert that phobias can be conditioned (1920).
- Little Albert became afraid of a white rat as well as many things that were similar in color and texture (e.g., a white rabbit, a furry coat, and a Santa Clause mask), thus further demonstrating "stimulus generalization."
- Though an important finding, today, Watson's experiment would be considered unethical.

Operant Conditioning

- **Operant conditioning** - the learning of *voluntary* behavior through the effects of pleasant and unpleasant consequences to responses.

  - **Thorndike's Law of Effect** - law stating that if a response is followed by a pleasurable consequence, it will tend to be repeated, and if followed by an unpleasant consequence, it will tend not to be repeated.
    - Getting paid for cleaning one's room will lead to more cleaning.
    - Getting in trouble after taking the car without asking will result in not taking the car.

FIGURE 5.5 **Thorndike puzzle box**
A typical Thorndike puzzle box. The cat is placed inside the box and can get out by pushing on the little platform to one side of the door—at first, accidentally. Each time the cat managed to escape, it would be put back into the box until, through trial and error, it knew to push on the platform to open the door.

Skinners Contribution

- Behaviorist, B. F. Skinner, wanted to study only observable, measurable behavior.
- He gave "operant conditioning" its name.
  - **Operant** - any behavior that is voluntary.
- Learning depends on what happens *after* the response — the consequence.

"Once it became clear to me that, by responding correctly to certain stimuli, I could get all the bananas I wanted, getting this job was a pushover."

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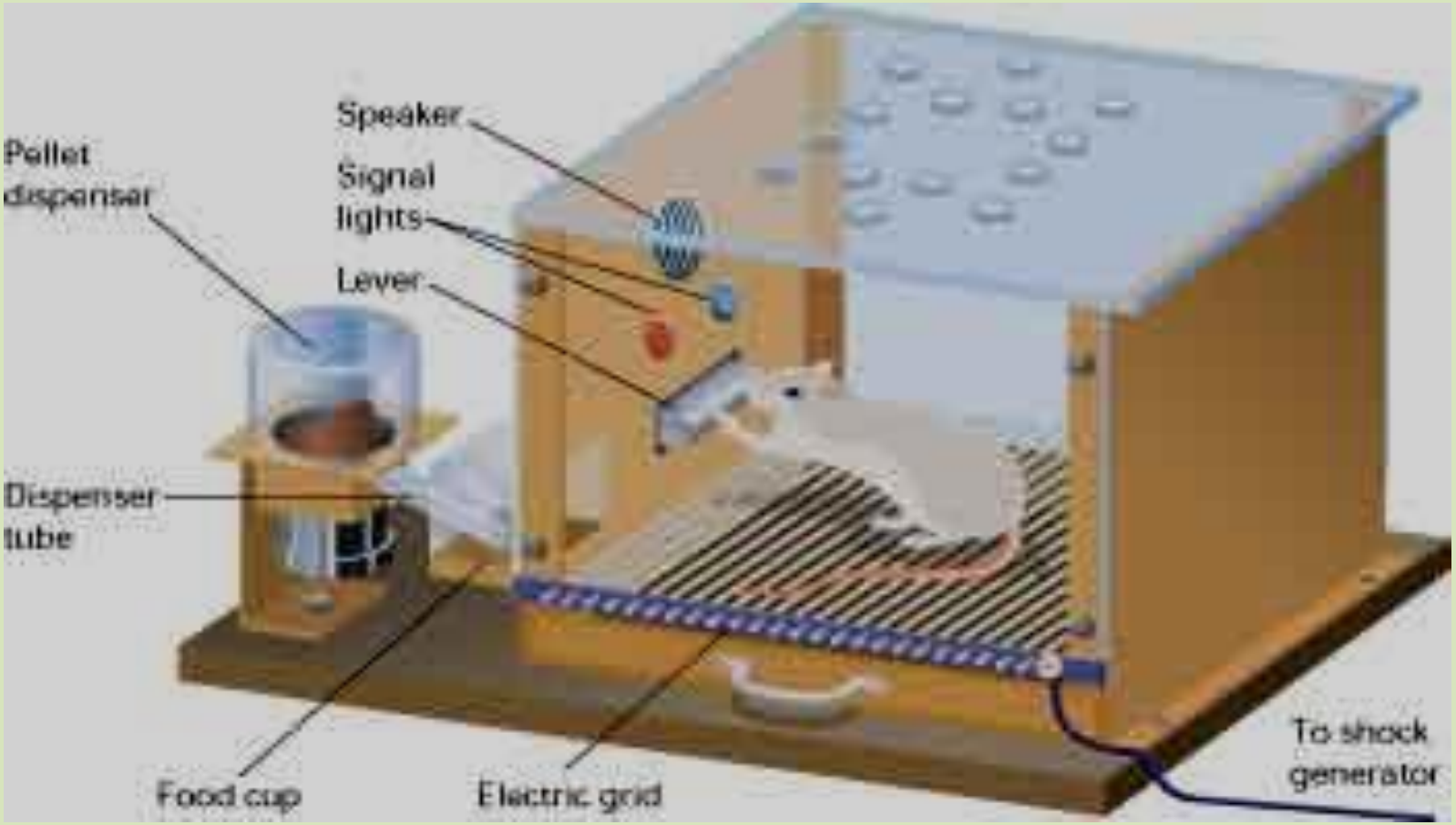
Operant Conditioning (The “Skinner Box”)




REINFORCEMENT
PUNISHMENT
Adding something valuable or desirable
Adding something unpleasant
Avoiding something unpleasant
Removing something valued or desired
POSITIVE
NEGATIVE

Reinforcement

- **Reinforcement** - any event or stimulus, that when following a response, increases the probability that the response will occur again.
  - **Primary reinforcer** - any reinforcer that is naturally reinforcing by meeting a basic biological need, such as hunger, thirst, or touch.
  - **Secondary reinforcer** - any reinforcer that becomes reinforcing after being paired with a primary reinforcer, such as praise, tokens, or gold stars.

Positive & Negative Reinforcement

- **Positive reinforcement** - the reinforcement of a response by the addition or experiencing of a pleasurable stimulus.
- **Negative reinforcement** - the reinforcement of a response by the removal, escape from, or avoidance of an unpleasant stimulus.

Example:
Taking aspirin for a headache is negatively reinforced – removal of headache!

Punishment

- **<u>Punishment</u>** - any event or object that, when following a response, makes that response less likely to happen again

- **<u>Punishment by application</u> (positive punishment)**- the punishment of a response by the addition or experiencing of an unpleasant stimulus

- **<u>Punishment by removal</u> (negative punishment)**- the punishment of a response by the removal of a pleasurable stimulus

How to Make Punishment More Effective

1. Punishment should immediately follow the behavior it is meant to punish.

2. Punishment should be consistent.

3. Punishment of the wrong behavior should be paired, whenever possible, with reinforcement of the right behavior.

TABLE 5.2 NEGATIVE REINFORCEMENT VERSUS PUNISHMENT BY REMOVAL

Example of Negative Reinforcement	Example of Punishment by Removal
Stopping at a red light to avoid getting in an accident.	Losing the privilege of driving because you got into too many accidents.
Mailing an income tax return by April 15 to avoid paying a penalty.	Having to lose some of your money to pay the penalty for late tax filing.
Obeying a parent before the parent reaches the count of "three" to avoid getting a scolding.	Being "grounded" (losing your freedom) because of disobedience.

Shaping

- **Shaping** - the reinforcement of simple steps in behavior that lead to a desired, more complex behavior.

TABLE 5.1 COMPARING TWO KINDS OF CONDITIONING

Operant Conditioning	Classical Conditioning
Goal is to increase the rate of an already occurring response.	Goal is to create a new response to a stimulus that doesn't normally produce that response.
Responses are voluntary.	Responses are involuntary and reflexive.
Consequences are important in forming an association.	Antecedent stimuli are important in forming an association.
Reinforcement must be immediate.	CS must occur immediately before the UCS.
An expectancy develops for reinforcement to follow a correct response.	An expectancy develops for UCS to follow CS.

Continuous VS Partial Reinforcement

- **Continuous reinforcement** – when an organism receives a reinforcer each time it displays a behavior
  - This reinforcement schedule is the quickest way to teach an organism a behavior; especially effective in training a new behavior.
- **Partial reinforcement** – an organism does not get reinforced every time it displays a behavior
  - There are several different types of partial reinforcement schedules. They include: **fixed interval**, **variable interval**, **fixed ratio**, **variable ratio**.

Schedules of Reinforcement

***Fixed*—determined (known)**

***Variable*— undetermined (unknown)**

***Ratio*—number of responses**

***Interval*—passage of time**

Fixed Ratio

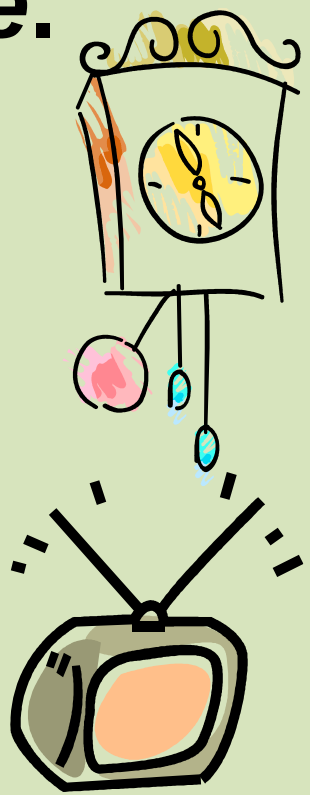
The reinforcer is given only after a *specified number* of responses.

Example: John gets a paycheck for every five days he substitutes.

Fixed Interval

The reinforcer is given following the first response occurring after a pre-determined *period of time*.

Example: Steve sits in front of the television every Thursday night at 7:00 p.m. sharp because he knows that his favorite show comes on at that time.



Variable Ratio

The reinforcer is obtained only after a varying number of responses have been made.

Example: Marty continuously hits the jackpot after pulling the lever on a slot machine for so many undetermined tries.

Variable Interval

The reinforcer is given following the first response occurring after a variable amount of time.

Example: Dale sits on the dock for hours waiting to catch a fish every now and then.

TABLE 5.3 FOUR WAYS TO MODIFY BEHAVIOR

	Reinforcement	Punishment
POSITIVE (Adding)	Something valued or desirable; *Positive Reinforcement* Example: getting a gold star for good behavior in school	Something unpleasant; *Punishment by Application* Example: getting a spanking for disobeying
NEGATIVE (Removing/ Avoiding)	Something unpleasant; *Negative Reinforcement* Example: avoiding a ticket by stopping at a red light	Something valued or desirable; *Punishment by Removal* Example: losing a privilege such as going out with friends

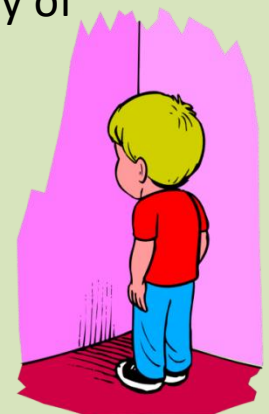
Techniques in Operant Conditioning

- **Behavior modification** - the use of operant conditioning techniques to bring about desired changes in behavior.

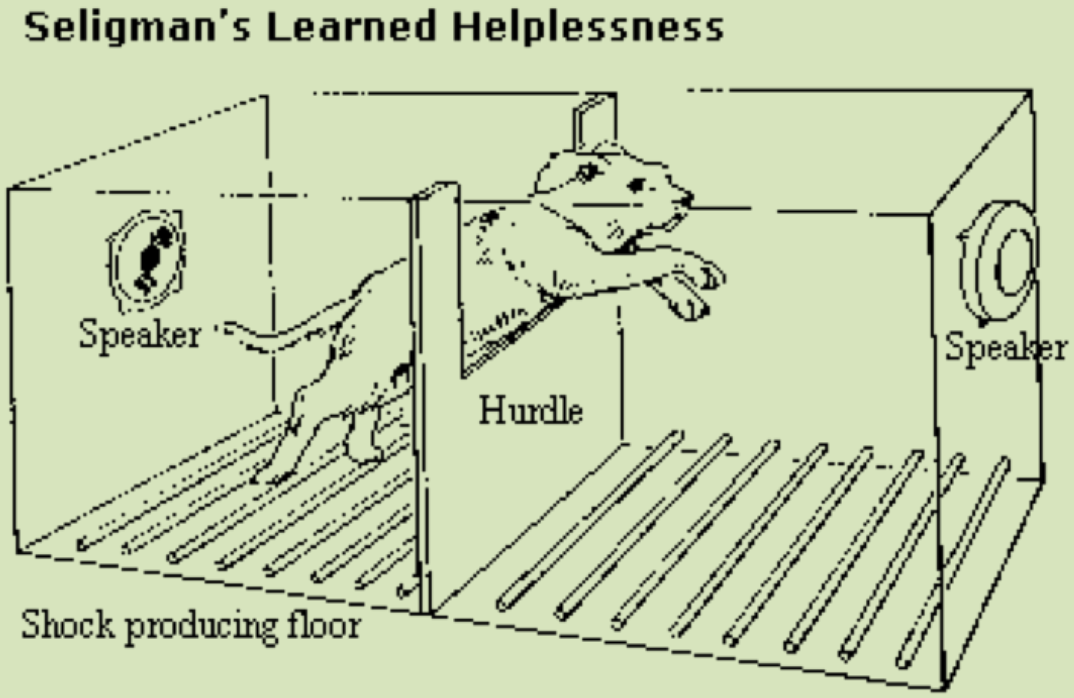
Token economy - type of behavior modification in which desired behavior is rewarded with tokens.

Time-out - a form of mild punishment by removal in which a misbehaving animal, child, or adult is placed in a special area away from the attention of others.

- Essentially, the organism is being "removed" from any possibility of positive reinforcement in the form of



Other Types of Learning



Learned helplessness

the tendency to fail to act to escape from a situation because of a history of repeated failures in the past

Insight

- **Insight** - the sudden perception of relationships among various parts of a problem, allowing the solution to the problem to come quickly
  - Cannot be gained through trial-and-error learning alone.
  - “Aha” moment

Observational Learning

- **<u>Observational learning</u>** - learning new behavior by watching a model perform that behavior

- **<u>Learning/performance distinction</u>** - referring to the observation that learning can take place without actual performance of the learned behavior

Bandura's classic Bobo doll study

Albert Bandura's famous Bobo doll experiment. This doll was used to demonstrate the impact of observing an adult model performing aggressive behavior on the later aggressive behavior of children. The children in these photos are imitating the adult model's behavior even though they believe they are alone and are not being watched.

Menu

4 Elements of Observational Learning

1. **ATTENTION**

   To learn anything through observation, the learner must first pay attention to the model.

2. **MEMORY**

   The learner must also be able to retain the memory of what was done, such as remembering the steps in preparing a dish that was first seen on a cooking show.

3. **IMITATION**

   The learner must be capable of reproducing, or imitating, the actions of the model.

4. **MOTIVATION**

   Finally, the learner must have the desire to perform the action.

(An easy way to remember the four elements of modeling is to remember the letters AMIM, which stands for the first letters of each of the four elements).