TOPIC: CLASSICAL CONDITIONING

Introduction to Classical Conditioning

◆ Ivan Pavlov (1849–1936): Russian physiologist; discovered classical conditioning in the 1890's.

◆ Pavlov was studying digestion in _____.

◆ Noticed the dogs salivating _____ they got their food (ex: seeing the lab assistant).

◆ Realized the dogs were associating environmental _____ with food, causing salivation.

◆ Pavlov was seeing a form of *learning*:

Learning: A relatively enduring _____ in behavior, thought, or knowledge as a result of past experience.

↓

Conditioning: A form of learning that involves making associations between environmental stimuli & an organism's _____.

↓

Classical Conditioning: The _____ of pairing a neutral stimulus with a bodily response until the neutral stimulus is able to elicit the bodily response.

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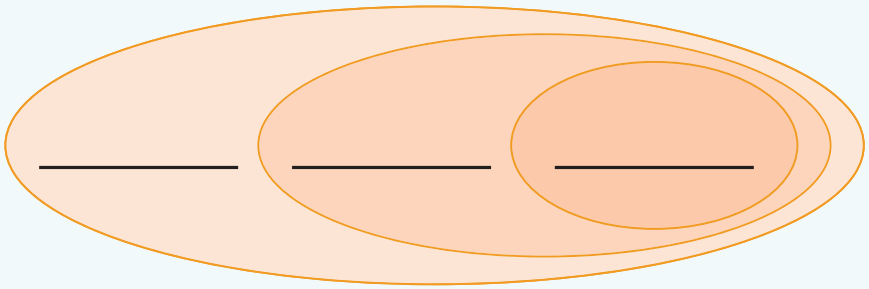
EXAMPLE

Fill in the Venn Diagram below with the labels in the box (the largest oval indicates the most general term; the smallest indicates the most specific term).



a) Classical Conditioning
b) Learning
c) Conditioning

PRACTICE

What trend did Pavlov notice that eventually became the focus of his research?

a) Dogs had the cognitive skills to show preference for certain foods.
b) Dogs displayed taste aversions that were individual to each dog and later supported by genetic markers.
c) The dogs would salivate in anticipation of the food when certain environmental cues were present.
d) The dogs seemed to have a stronger appetite around certain caretakers.

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Principles of Classical Conditioning

◆ We think of classical conditioning as having ____ stages:

1 Before Conditioning

_____ → 

_____

_____ → 

No response

◆ Measure of responses that already exist.

- **Unconditioned Stimulus** (US): Stimulus that _____ a reflexive response.
- **Unconditioned Response** (UR): A _____ response produced by the US.
- **Neutral Stimulus** (NS): A stimulus that does _____ naturally elicit a consistent response.

2 Acquisition

_____ + 

_____ → 

_____

◆ Phase of conditioning where the NS and US are paired.

- _____ is taking place!

◆ Note: For strongest learning, the neutral stimulus should _____ the US.

3 After Conditioning

_____ → 

_____

◆ Now the _____ elicits the UR! Our terminology changes:

- **Conditioned Stimulus** (CS): A previously _____ stimulus that produces a reliable response.
- **Conditioned Response** (CR): Reaction similar (or identical to) the _____ that is produced by a CS.

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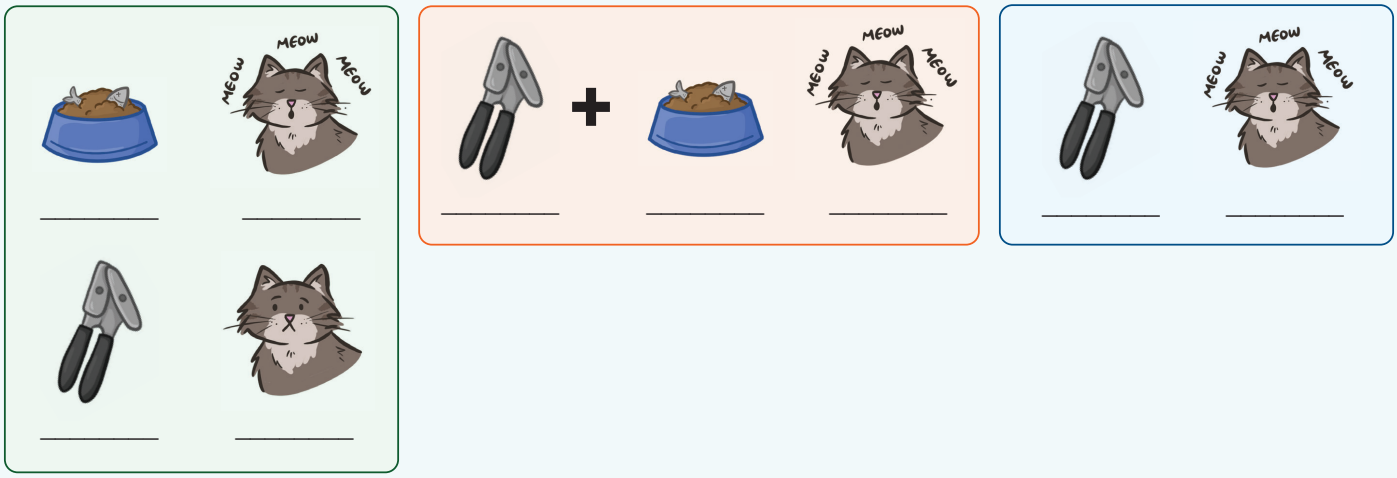
EXAMPLE

In the situation below, label the unconditioned stimulus (US), unconditioned response (UR), neutral stimulus (NS), conditioned stimulus (CS), and conditioned response (CR). Then, put a star on the box that represents the phase where learning is taking place.



PRACTICE

Which term describes the bell in Pavlov's experiment **before** the acquisition phase?

a) Neutral stimulus.
b) Conditioned stimulus.
c) Unconditioned stimulus.
d) Excitatory stimulus.

PRACTICE

Dr. Cho runs a lab studying learning in rats. Rats typically show a fear response (like freezing) when presented with a loud noise. Dr. Cho pairs a loud noise with a flash of light repeatedly until the rats freeze at the light alone. In this study, what is the conditioned stimulus?

a) The rat.
b) The fear response (freezing).
c) The light.
d) The loud noise.

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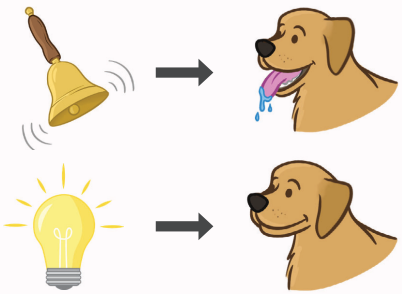
Extensions of Conditioned Responses: Second-Order Conditioning

◆ Conditioned responses can be extended:

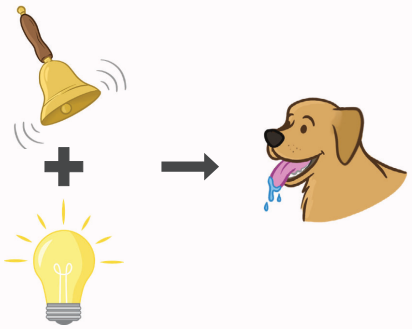
Second-Order Conditioning / Higher-Order Conditioning

Procedure in which a conditioned stimulus becomes paired with a new _____ stimulus.

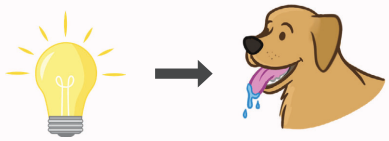


Original _____ elicits CR.

_____ NS does not.



New NS is _____ with CS through acquisition.



New _____ elicits CR.

EXAMPLE

Put the following events in order for higher-order conditioning. Then, circle the step or steps where the **original** CS is **no longer needed** to produce the CR.

_____ → _____ → _____

a) New stimulus elicits conditioned response.
b) Original conditioned response is established.
c) Acquisition – pairing the new NS and CS.

PRACTICE

For higher-order conditioning to occur, a new neutral stimulus must be paired with what?

a) A conditioned stimulus.
b) Another neutral stimulus.
c) An unconditioned stimulus.
d) An extinct stimulus.

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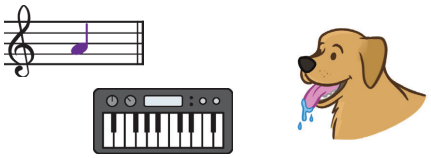
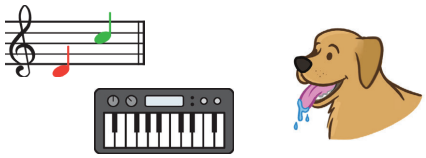
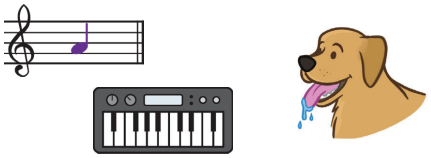
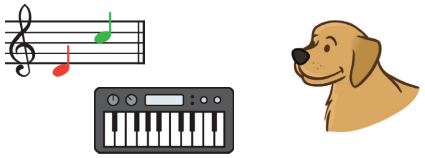
Extensions of Conditioned Responses: Stimulus Generalization and Discrimination

- Conditioned responses can be extended or _____.
- **Stimulus generalization**: The tendency for stimuli _____ to the CS to generate the CR.
  - CS → _____.
  - Similar stimuli → _____.

- **Stimulus discrimination:** Ability to distinguish between similar but related stimuli.
  - CS → CR.
  - Similar stimuli → _____ response.

- As stimulus discrimination _____, stimulus generalization _____, and vice versa.

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EXAMPLE

In the examples below, determine if it is talking about stimulus generalization or stimulus discrimination. Write a G on the line for generalization and a D on the line for discrimination.

a) A lab rat learns that it often gets fed first thing in the morning when the researcher enters. Now, any time a light turns on, it runs to its food bowl. _____

b) Sheepdogs are trained using three distinct whistle calls. Based on which whistle sound they hear, they will perform a different task. _____

c) A cat is classically conditioned to meow when they hear certain words. After a while, the cat starts to meow any time a person speaks. _____

PRACTICE

Which of the following statements are accurate?

I) A cat runs to the kitchen every time they hear kibble being poured. Over time, they also begin to run to the kitchen anytime someone pours cereal. This is an example of stimulus generalization.

II) As stimulus generalization decreases, stimulus discrimination also decreases.

III) In stimulus discrimination, a similar stimulus will NOT elicit the conditioned response.

a) I & II. b) II & III. c) I & III. d) I, II, & III.

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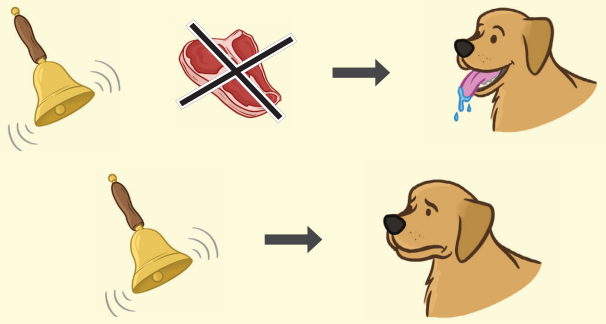
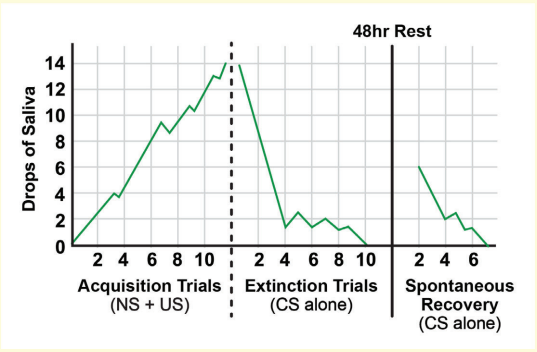
Extinction

Extinction

The elimination of a learned response; occurs when the CS is repeatedly presented _____ the US.

- After a few repetitions, _____ no longer creates _____.

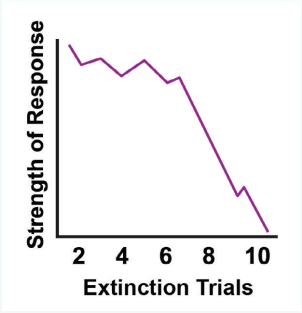


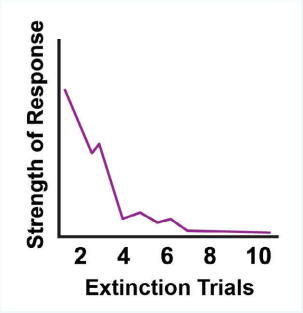


- Extinction can be affected by:
  - Duration and _____ original conditioning.
  - Biological preparedness (ex: conditioned _____ responses are harder to extinguish).
- **Spontaneous Recovery:** ____appearance of a CR after apparent extinction, usually after a period of rest.

EXAMPLE

The graphs of two extinction trials are shown below. Match the statements in the box with the graph that it describes.





a) This extinction took fewer trials to achieve.
b) This extinction took more trials to achieve.
c) This was likely a more established response.
d) This was likely a less established response.

_____ _____

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PRACTICE

Which of the following situations is an example of extinction?

a) Your dog runs to the door when he sees you put your sneakers on because you always wear them on your walks. Eventually, you start wearing your sneakers all day long because they are so comfortable, and over time, your dog stops running to the door when he sees you put your sneakers on.

b) A toddler notices that whenever they put their crayons in a box, their parents praise them. They start putting their crayons in the box after every play session.

c) A teenager feels anxious when they don't study for an exam. Before their next exam, they spend extra time studying and feel less anxious.

d) Your cat develops a habit of clawing at the corner of the couch. Every time your cat does this, you redirect them with their favorite toy. Over time, they stop clawing the couch.

PRACTICE

After extinction, a conditioned response may reappear when the conditioned stimulus is presented again after some time. What is this phenomenon?

a) Stimulus generalization.

b) Stimulus discrimination.

c) Spontaneous recovery.

d) Higher-order conditioning.

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Common Misconceptions

Misconception 1

Classical conditioning is a simple association.

Correction:

In classical conditioning we learn that the conditioned stimulus is a signal that _____ an event (the US).

Misconception 2

During acquisition, the NS and US are presented simultaneously.

Correction:

For stronger conditioning, the neutral stimulus should _____ the US.