

# PSYC 337 LEARNING

## Session 3 – Classical Conditioning

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# Session Overview

- Classical conditioning is just one of the different types of learning processes
- It is a form of learning by association
  - that is, association between a stimulus and a response (S-R)
- This session takes you through the history of classical conditioning and the explanations of the key features so you can apply the concepts to everyday situation

# Session Objectives

- At the end of the session, the student will be able to
  - define what classical conditioning is
  - outline the history of classical conditioning
  - explain the elements and features of classical conditioning
  - discuss the factors that can affect classical conditioning
  - explain how classical conditioning can be applied to humans

# Session Outline

- The key topics to be covered in the session are as follows:
  - Topic One: History of Classical Conditioning— Pavlov's discovery
  - Topic Two: What is Classical Conditioning?
  - Topic Three: Elements of Classical Conditioning
  - Topic Four: Pavlov's Experiments & Features of Classical Conditioning
  - Topic Five: Factors affecting Classical Conditioning I & II
  - Topic Six: Application of Classical Conditioning Principles to Humans

# Reading List

- Relevant text/chapters and reading materials are available on Sakai

Topic One

# **HISTORY OF CLASSICAL CONDITIONING: PAVLOV'S DISCOVERY**



# History of Classical conditioning:

## Pavlov's discovery

- It started in the early 1900s when a Russian Psychologist Ivan Pavlov investigated the way the body digests food
- He routinely put meat powder in a dog's mouth and measured salivation
- He discovered that after a few sessions, precise measurements were impossible
  - because the meat powder was not the only thing that caused the dog to salivate
- The mere sight of the food bowl or even the sound of the experimenter's footsteps was enough to let the dog salivate (Cooch, 2000)
- Pavlov realized that the dog's association of these sight and sounds with the food was an important type of learning, which came to be called **classical conditioning**

# History of Classical conditioning: Pavlov's discovery

- Pavlov observed that the dog's behavior included both **learned** and **unlearned components**
- The unlearned part:
  - Some stimuli automatically produces certain responses apart from prior learning.
- These are inborn or innate
- While the **learned** part:
  - Some stimuli can produce certain responses only when other stimuli are present



Topic Two

# WHAT IS CLASSICAL CONDITIONING?



# What is Classical Conditioning?

- A learning process in which a neutral stimulus becomes associated with a meaningful stimulus and acquires the capacity to elicit a similar response just like the meaningful stimulus
- Here, learned association involves the link between two stimuli (**conditioned stimulus** and **unconditioned stimulus**)
- An organism learns a response to a neutral stimulus that normally does not bring about that desired response

# What is Classical Conditioning?

- So a previously neutral stimulus comes to elicit that desired response through its association with a stimulus that naturally brings about a response
- That is, a neutral stimulus (NS) becomes associated with an unconditioned stimulus (UCS) to elicit conditioned responses (CR)

Topic Three

# **ELEMENTS OF CLASSICAL CONDITIONING**



# Elements of Classical Conditioning

- **Unconditioned Stimulus (UCS)**
  - A stimulus that brings about a response without having been learned, (there is no prior learning, does not involve learning, it is innate)
- **Unconditioned Response (UCR)**
  - An unlearned response that is automatically elicited by the unconditioned stimulus such as salivating at the smell of food

# Elements of Classical Conditioning

## Unconditioned

- The term unconditioned is used because
  - the response does not depend on any previous experience or conditioning with the stimulus
  - It is innate
  - It is inborn
  - Does not require learning

# Elements of Classical Conditioning

- **Neutral Stimulus (NS)**
  - A stimulus that normally will have no effect on the desired response
  - It will not get the organism to elicit the targeted response
  - It has no relationship whatsoever with the unconditioned stimulus
- The intention is to pair it with the natural stimulus, to see how the organism will respond to it (neutral stimulus) after some time

# Elements of Classical Conditioning

- **Conditioned Stimulus (CS)**
  - A previously neutral stimulus that eventually elicits the conditioned response after being associated with the unconditioned stimulus
- **Conditioned Response (CR)**
  - It is the response to the conditioned stimulus that occurs after the neutral stimulus and unconditioned stimulus have been paired (Pavlov, 1927)
    - It is a learned response



# Elements of Classical Conditioning

- E.g., If a teacher always screams at students in class and that frightens them, just the sight of that teacher or even the mention of the teacher's name will eventually frighten them.
- In this case:
  - Neutral Stimulus (NS) is the initial sight of the teacher or the mention of the teacher's name
  - The screaming is the Unconditioned Stimulus (UCS)
  - The fright is the Unconditioned Response (UCR) because we naturally respond to a scream with fright
  - Later on, the sight of the teacher or the mention of the teacher's name is the Conditioned Stimulus (CS) and the fright at the sight of the teacher is the Conditioned Response (CR)

# Sample Question

- Read the following carefully and identify the learned and unlearned behaviours.
- Mark a 'L' if you think the behaviour is an example of a learned behaviour and a 'U' if you think the behaviour is an example of unlearned behaviour
- A child who has a fear of dogs.
- Pulling your hand away when you touch a heated stove.
- Blinking your eye when air is blown into it.
- Throwing up at the sight of something noxious.
- Reacting to pain
- Startling at a sudden scream

Topic Four

# **PAVLOV'S EXPERIMENT & FEATURES OF CLASSICAL CONDITIONING**



# Pavlov's Edžperiwete

- Iŷ studLJiŷg a doĝs respoŷse to | arious stiŷuli associated with meat powder, Pavlov rang a bell before giving meat powder to the dog
- Until then, ringing the bell elicited only a neutral reflex such as waking the dog up from a short sleep, because the bell was a neutral stimulus
- Neutral because it did not elicit th targeted response (salivation)

# Pavlov's Edžperiwê Yt

- After, pairing the bell and the meat powder for a long time, the dog began to associate the sound of the bell with the food and salivated when it heard the bell ringing
- This is because the bell had become a conditioned (learned) stimulus.
  - So the salivation to the bell is a conditioned response, learned behaviour
- Before conditioning or learning, the bell and the meat powder were not related, but after their association, the conditioned stimulus produced conditioned responses

# Summary of how Classical Conditioning works

## Before Conditioning

Neutral Stimulus      →      Response  
(Ringing of the bell)                      (Waking the dog up)

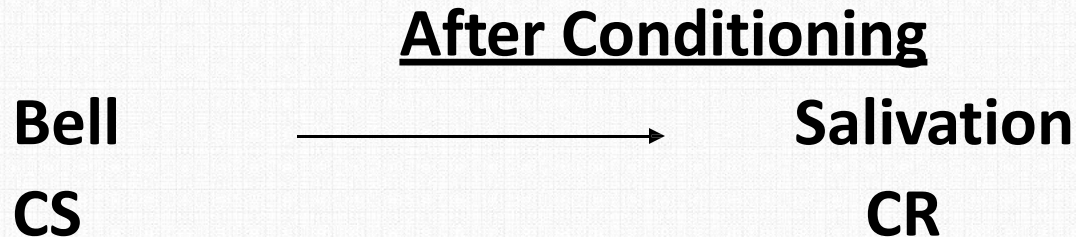
- The bell is presented alone, and it produces a response such as waking the dog from sleep

UCS                      →                      UCR  
(Meat Powder)                      (Salivation)

- The meat powder is presented alone, and it produces an unconditioned response which is salivation



# Summary of how Classical Conditioning works



- After an association has been formed between the bell and the meat powder, the bell is presented alone
- And because the dog has been conditioned to think that it will be followed by meat powder
  - It salivates at the sound of the bell in anticipation of the meat powder following it

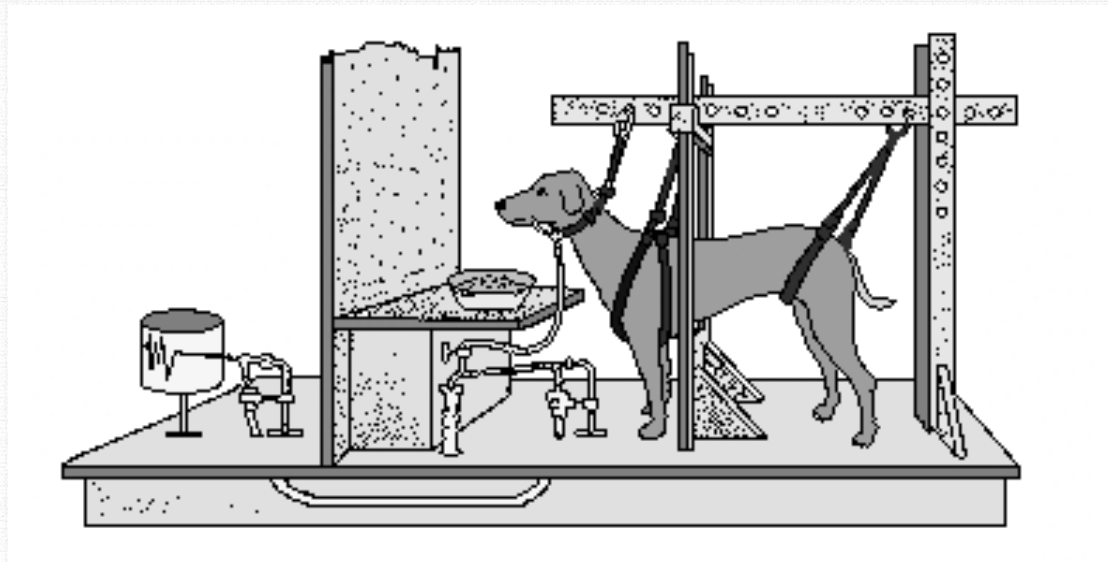






# Summary of how Classical Conditioning works

- Below is a picture that shows how Pavlov used the dog and measured salivation in the laboratory



(Courtesy: Weiten, 2002)

# Features of Classical Conditioning

- **Acquisition:** The development of a CR as a result of the continuous pairing of the CS and UCS
  - it is the process by which an organism learns the association involved in classical conditioning
- During conditioning, the strength of CR gradually increases as the CS & UCS are paired repeatedly
- Factors Affecting Acquisition
  - the **strength of the UCS,**
  - **how salient the CS is,**
  - **the timing of the presentation of the UCS and**
  - **contingency**
- Certain procedures require several pairings to produce CRs others produce such rapid conditioning that a single pairing is sufficient

# Features of Classical Conditioning

- **Extinction:** The process of unlearning a learned response (CR) because of the removal of the original source of learning (UCS)
- If the UCS no longer follows the CS, the CR becomes weaker over time and eventually stops occurring.
- Extinction occurs when an already conditioned stimulus is presented alone without the UCS
  - which results in the decrease and eventual disappearance of the CR.

# Features of Classical Conditioning

- The magnitude of the CR gradually decreases with the number of trials in which no UCS occurs.
- Note: Extinction does not mean that the CR no longer exists.
  - It is merely suppressed

# Features of Classical Conditioning

- **Spontaneous Recovery (Reacquisition):** The process by which a CR recurs after a time lapse without further conditioning
- During extinction the CS - UCS association is not eliminated, it is only suppressed

# Features of Classical Conditioning

- **Stimulus Generalization:** The tendency for a different stimulus similar to the original CS to produce a similar response as the original CS
- There is the possibility for other stimulus similar to the CS could elicit response, without being paired with a UCS
- The greater the similarity between the two stimuli, the greater the likelihood of stimulus generalization occurring
- Note: The CR evoked by the new stimulus is not as intense as the original CR.



# Features of Classical Conditioning

- **Stimulus Discrimination:** It is a situation where an organism response to certain stimuli but not to others.
- Thus an organism eventually can discriminate between two (or more) similar stimuli
- It learns to respond differently to stimuli that are distinct from the conditioned stimulus in some dimensions
- For example, we learn to distinguish between a dog and a wolf just as we distinguish between the red light and green light of a traffic light

# Features of Classical Conditioning

- **Higher Order Conditioning:** It occurs established CS is then paired repeatedly with a another NS until the NS evokes targeted behavior, the same response as the UCS
- Note:
  - The original CS acts in effect as a UCS
    - This is called second order conditioning
- E.g., After the dog Pavlov's experiment has learned to salivate at the sound of a bell
  - Then, it is repeatedly exposed to a light followed by the bell, without presenting the meat powder
    - Later, when the dog sees the light and hears the bell it will begin responding to the light by salivating

# Features of Classical Conditioning

## Example of higher order conditioning

1. CS + UCS → UCR  
(bell) + (meat powder) (salivation)
2. CS → CR  
(bell) (salivation)
3. CS<sub>2</sub> + CS<sub>1</sub> → CR  
(light) (bell) (salivation)
4. CS<sub>2</sub> → CR<sub>2</sub>  
(light) (salivation)

# Features of Classical Conditioning

- **Overshadowing:** A situation where two stimuli are presented together as a compound, and one completely dominating or overshadowing the other even though both would be perfectly effective if presented separately
- When two or more CSs are paired with a single UCS, the more salient of the two CSs will produce the strongest CR.
  - For example, flashing lights and a siren are both predictors of an emergency vehicle
    - But most of us have a stronger response to one than the other.
- It comes about if one stimulus is more salient than the other