Unit – III
Lesson - 3

MOTIVATION AND LEARNING

Piaget's Theory of Cognitive Development

Prepared by :
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Jean Piaget

PIAGET (1896 - 1980)

- Swiss Psychologist, worked for several decades on understanding children's cognitive development
- Most widely known theory of cognitive development.
- Was intrigued by kids' thoughts & behavior, & worked to understand their cognitive development

PIAGET: BACKGROUND

- Young Piaget was incredibly precocious
  - Published first paper at 10
  - Wrote on mollusks, based on these writings was asked to be curator of mollusks at a museum in Geneva (he declined in order to finish secondary school)
  - Earned his doctorate in natural sciences at 21
  - Began to study psychology, applying intelligence tests to school children

CONSTRUCTIVISM

- Assumption that learning is an active process of construction rather than a passive assimilation of information or rote memorization.
- Credited for founding constructivism
- Has had a large influence on American schools

…PIAGET AND CONSTRUCTIVISM

- Best known for idea that individuals **construct** their understanding, that learning is a **constructive** process
  - Active learning as opposed to simply absorbing info from a teacher, book, etc.
  - The child is seen as a ‘little scientist’ constructing understandings of the world largely alone

….PIAGET & CONSTRUCTIVISM

- believed **all** learning is constructed, whether it is something we are taught or something we learn on our own.
- Whether or not we are taught in a "constructivist" manner, Piaget believed we are constructing knowledge in all our learning.

PIAGET & LEARNING

- Two main states – ***equilibrium*** & ***disequilibrium***
- Believed that we are driven or motivated to learn when we are in disequilibrium
  - We want to understand things

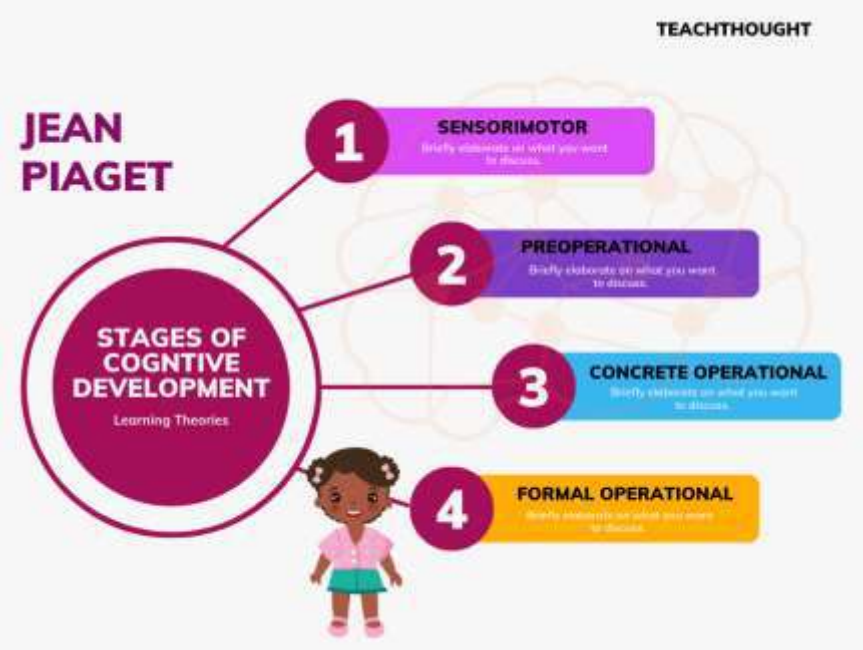
Piaget & Learning

- **Equilibration**: assimilation & accommodation
  - We adjust our ideas to make sense of reality
  - யதார்த்தத்தைப் புரிந்துகொள்ள எங்கள் கருத்துக்களை நாங்கள் சரிசெய்கிறோம்.
- **Assimilation**:process of matching external reality to an existing cognitive structure. வெளிப்புற யதார்த்தத்தை ஏற்கனவே உள்ள அறிவாற்றல் அமைப்புடன் பொருத்துவதற்கான செயல்முறை.
- **Accommodation**:
  - When there's an inconsistency between the learner's cognitive structure & the thing being learned the child will reorganize her thoughts.
  - கற்பவரின் அறிவாற்றல் அமைப்புக்கும் கற்றுக்கொள்ளப்படும் விஷயத்திற்கும் இடையில் முரண்பாடு இருக்கும்போது, குழந்தை தனது எண்ணங்களை மறுசீரமைக்கும்.

EXAMPLE OF LEARNING….

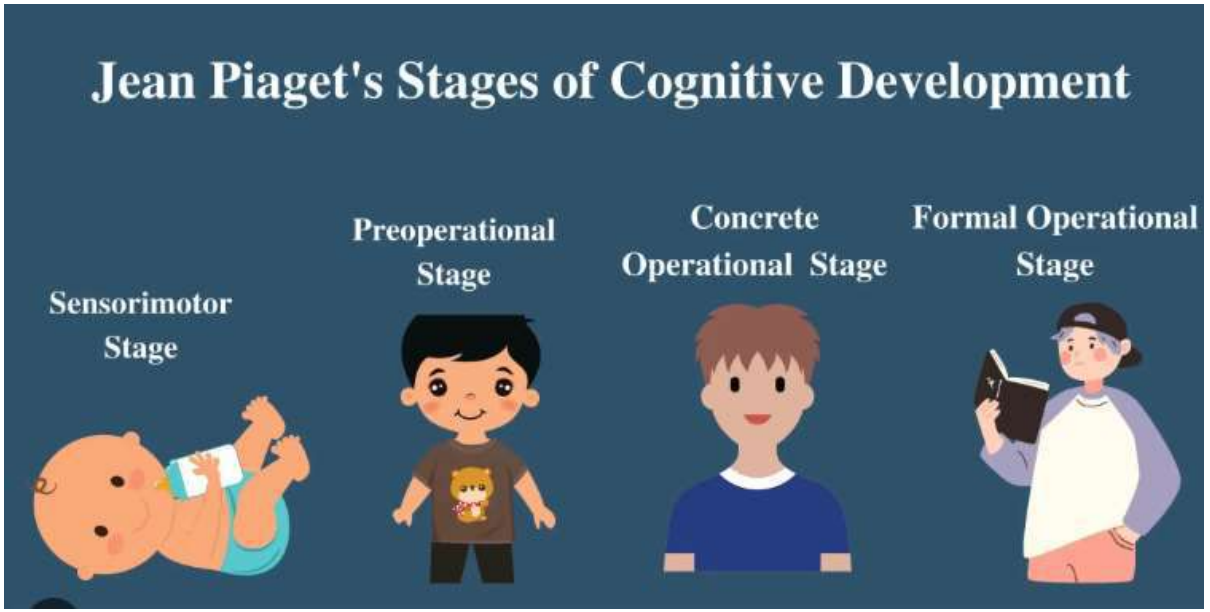
PIAGET'S STAGES OF COGNITIVE DEVELOPMENT

- A child's capacity to understand certain concepts is based on the child's developmental stage



PIAGET'S FOUR STAGES

- Believed that all children develop according to four stages based on how they see the world.
  - He thought the age may vary some, but that we all go through the stages in the same order.
    1. Sensory-motor (birth –2 years)
    2. Preoperational (~2-7)
    3. Concrete operational (~7-11)
    4. Formal operations (~12-15)



SENSORIMOTOR STAGE

- Birth to about 2 years, rapid change is seen throughout
- The child will:
  - Explore the world through senses & motor activity
  - Early on, baby can't tell difference between themselves & the environment
  - If they can't see something then it doesn't exist
  - Begin to understand cause & effect
  - Can later follow something with their eyes

PREOPERATIONAL STAGE

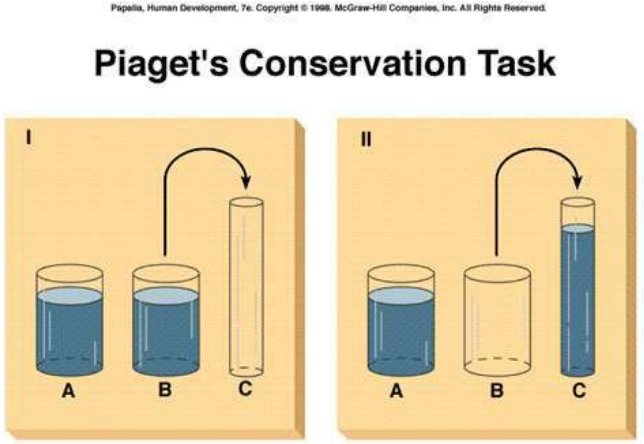
- About 2 to about 7
  - Better speech communication
  - Can imagine the future & reflect on the past
  - Develop basic numerical abilities
  - Still pretty egocentric, but learning to be able to delay gratification
  - Can't understand conservation of matter
  - Has difficulty distinguishing fantasy from reality (ex: cartoon characters are real people).

…MORE PREOPERATIONAL

- Conservation of matter – understanding that something doesn't change even though it looks different, shape is not related to quantity
- Ex: Are ten coins set in a long line more than ten coins in a pile?
- Ex: Is there less water if it is poured into a bigger container?

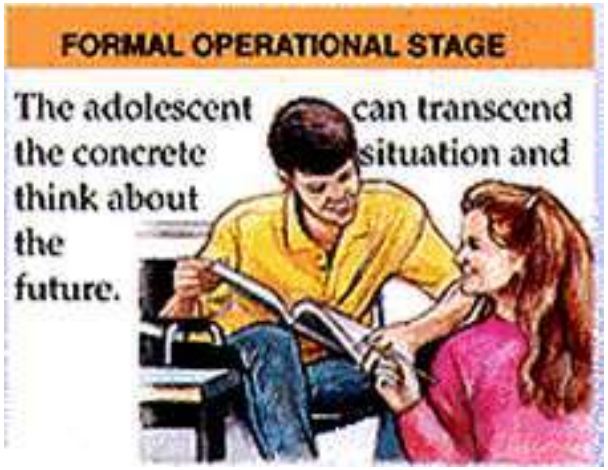
CONCRETE OPERATIONAL STAGE

- From about 7 to about 11
  - Abstract reasoning ability & ability to generalize from the concrete increases
  - Understands conservation of matter



FORMAL OPERATIONS

- From about 12 to about 15
  - Be able to think about hypothetical situations
  - Form & test hypotheses
  - Organize information
  - Reason scientifically



… PIAGET'S DEVELOPMENT

- Development happens from one stage to another through interaction with the environment.
- Changes from stage to stage may occur abruptly and kids will differ in how long they are in each stage.
- Cognitive development can only happen after genetically controlled biological growth occurs.

...PIAGET'S DEVELOPMENT

- Development leads to learning
  - Drive for development is internal
  - The child can only learn certain things when she is at the right developmental stage
  - Environmental factors can influence but not direct development
  - Development will happen naturally through regular interaction with social environment

PIAGET & EDUCATION

- Piaget did not think it was possible to hurry along or skip stages through education

- Regardless, many American schools will try to teach to the stages in an attempt to accelerate development

PROBLEMS WITH PIAGET'S THEORY

- Children often grasp ideas earlier than what Piaget found
- Cognitive development across domains is inconsistent (e.g. better at reading than math)
- Studies have shown that development can to some degree be accelerated
- குழந்தைகள் பெரும்பாலும் பியாஜெட் கண்டறிந்ததை விட முன்னதாகவே கருத்துக்களைப் புரிந்துகொள்கிறார்கள்
- அறிவாற்றல் வளர்ச்சி பல்வேறு துறைகளில் சீரற்றதாக இருக்கும் (எ.கா. கணிதத்தை விட வாசிப்பதில் சிறந்தவர்)
- ஆய்வுகள் வளர்ச்சியை ஓரளவு துரிதப்படுத்த முடியும் என்பதைக் காட்டுகின்றன.

BEHAVIOURAL THEORY

BEHAVIOURIST PERSPECTIVE ON LEARNING

Key Concept

- Behaviour is acquired through conditioning during interactions with the environment.
- Most behaviours can be measured, trained, changed, or conditioned.

Types of Conditioning

Learning through association (e.g., Pavlov's experiment).

- Stimulus-response connections are formed.

Operant Conditioning

- Learning through reinforcement and punishment (e.g., Skinner's experiments).Behaviour is shaped by consequences.

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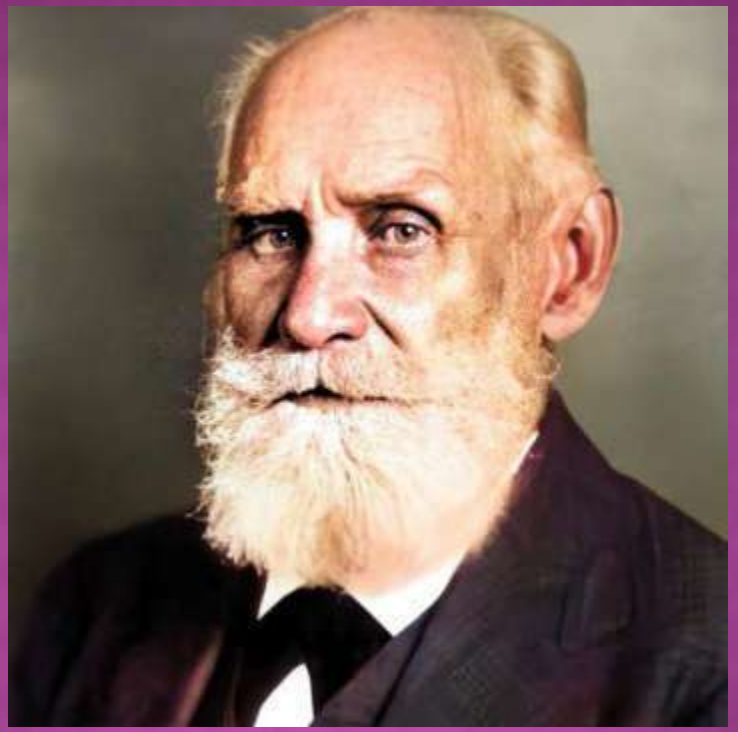
BEHAVIOURAL THEORY
PAVLOV'S CLASSICAL CONDITIONING LEARNING THEORY



INTRODUCTION

- Another a principal form of learning is the conditioned response.
- Conditioning can be described as a procedure for studying learning in which a discrete response is attached to a more or less discrete stimulus.

Types of Conditioning in Modern Psychology

- **1. Classical ConditioningProponent:** Ivan P. Pavlov (1849–1936)Key

Concept: Learning occurs through association.

Example: Pavlov's dog experiment (linking a bell sound with food).

- **2. Instrumental ConditioningProponent:** Edward Thorndike (1857–1924)Key

Concept: Learning occurs through trial and error.

Example: Thorndike's puzzle box experiment (law of effect).

CLASSICAL CONDITIONING

- Early behaviorists argued that learning occurs through temporal contiguity (தொடர்ச்சி), the simultaneous presentation of two events (Guthrie, 1959).

Classical conditioning

- Learning as the pairing of automatic responses to new stimuli.

Unconditioned Stimulus and Response

- What is an Unconditioned Stimulus (UCS)?
- A stimulus that naturally and automatically triggers a response.

Examples:

- **Blowing into an eye** → Reflex to close the eye.
- **Sound of an explosion** → Fear and heart rate increase.

What is an Unconditioned Response (UCR)?

- The automatic, natural reaction to an unconditioned stimulus.
- Happens without prior learning or conditioning.

CLASSICAL CONDITIONING

Meaning of classical conditioning

- Classical conditioning is a type of learning in which an organism learns to connect, or associate, stimuli so that a neutral stimulus (such as the sight of a person) becomes associated with a meaningful stimulus (such as food) and acquires the capacity to elicit a similar response.

Definition of Classical Conditioning

- Classical conditioning is **a form of associative learning** in which a **neutral stimulus becomes associated with a meaningful stimulus** and acquires the capacity to elicit a similar response.
- "Classical conditioning is a type of learning that **happens unconsciously.**"

PAVLOV'S DOGS EXPERIMENT

Background

- Conducted in the 1890s by Ivan Pavlov, a Russian physiologist.

Objective:

- Study the process of learning through association (classical conditioning).Experimental Setup
- Dog strapped in a harness on an experimental table in a soundproof room.
- Tube connected to the dog’s salivary gland to measure saliva secretion.
- Food presented through automatic devices.
- Observer remained hidden, viewing via mirrors to avoid distractions.

PAVLOV'S DOGS EXPERIMENT

Three steps of Pavlov's dog experiment

Step 1

Before conditioning

- The neutral stimulus produces no relevant response.
- The Unconditioned (unlearned) stimulus elicits the unconditioned response.

US (food) → UR (salivation)

NS (bell) → No response

PAVLOV'S DOGS EXPERIMENT

Three steps of Pavlov's dog experiment

Step 2

During conditioning

- The neutral stimulus is repeatedly paired with the unconditioned (unlearned) stimulus to produce the unconditioned response.

NS (bell) + NS (food) ⟶ UR (salivation)

PAVLOV'S DOGS EXPERIMENT

Three steps of Pavlov's dog experiment

Step 3

After conditioning

- The neutral stimulus has become a conditioned stimulus (CS) (learned), and it now produces a conditioned response (CR) (learned) that is usually similar to the unconditioned response (UCR).

CS (bell) CR (salivation)

PAVLOV'S DOGS EXPERIMENT

Principles of Pavlov's classical conditioning

1. Acquisition

- The acquisition phase is the initial learning of the conditioned response – for example, the dog salivating at the sound of the bell.

2. Extinction

- Once learnt, a conditioned response will not remain indefinitely. Extinction is used to describe the disappearance of the conditioned response brought about by repeatedly presenting the bell, for example, without then presenting food.

3. Generalization

- After a conditioned response to one stimulus has been learnt, it may also respond to similar stimuli without further training. If a child is bitten by a dog, the child may fear not only that particular dog, but all dogs.

PAVLOV'S DOGS EXPERIMENT

Principles of Pavlov's classical conditioning

4. Discrimination

- Discrimination is the opposite of generalization. An individual learns to produce a conditioned response to one stimulus but not to another similar stimulus.

5. Spontaneous recovery

- Even after extinction, the conditioned response can sometimes come back at random times, even years later.

6. Contiguity:

- The more closely in time two events occurred, the more likely they are to become associated; as time passes, association becomes less likely.

IMPLICATIONS OF CLASSICAL CONDITIONING IN THE CLASSROOM

Key Takeaways

Positive Associations:

- Teachers should ensure students associate positive emotional experiences with learning.
- Encouragement and supportive environments enhance engagement and motivation.

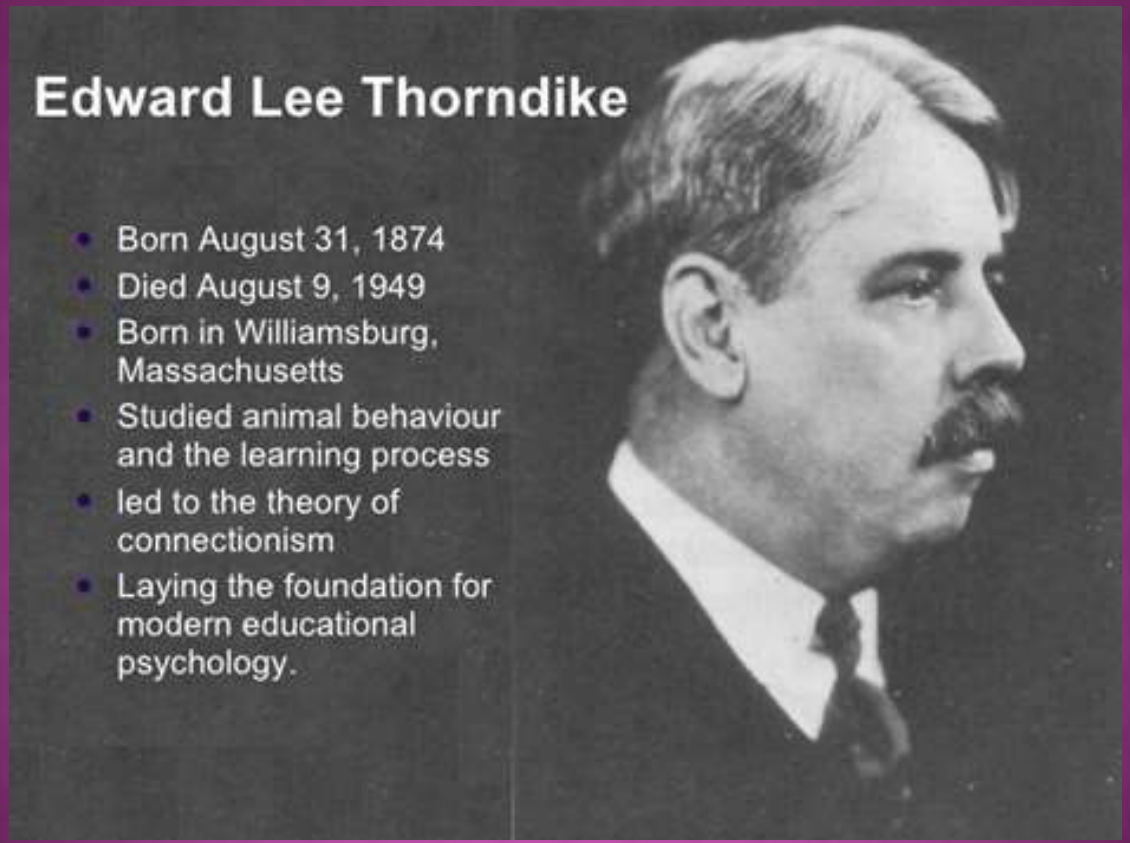
Negative Associations:

Negative experiences (e.g., bullying or humiliation) can lead to:

- School phobia or fear of attending school.
- Dislike for specific subjects that persists over time.

Example: A student bullied at school may associate the environment with fear. Being punished or humiliated in a subject can result in long-term aversion to that subject.

THORNDIKE'S TRAIL AND ERROR LEARNING THEORY



INTRODUCTION TO THORNDIKE

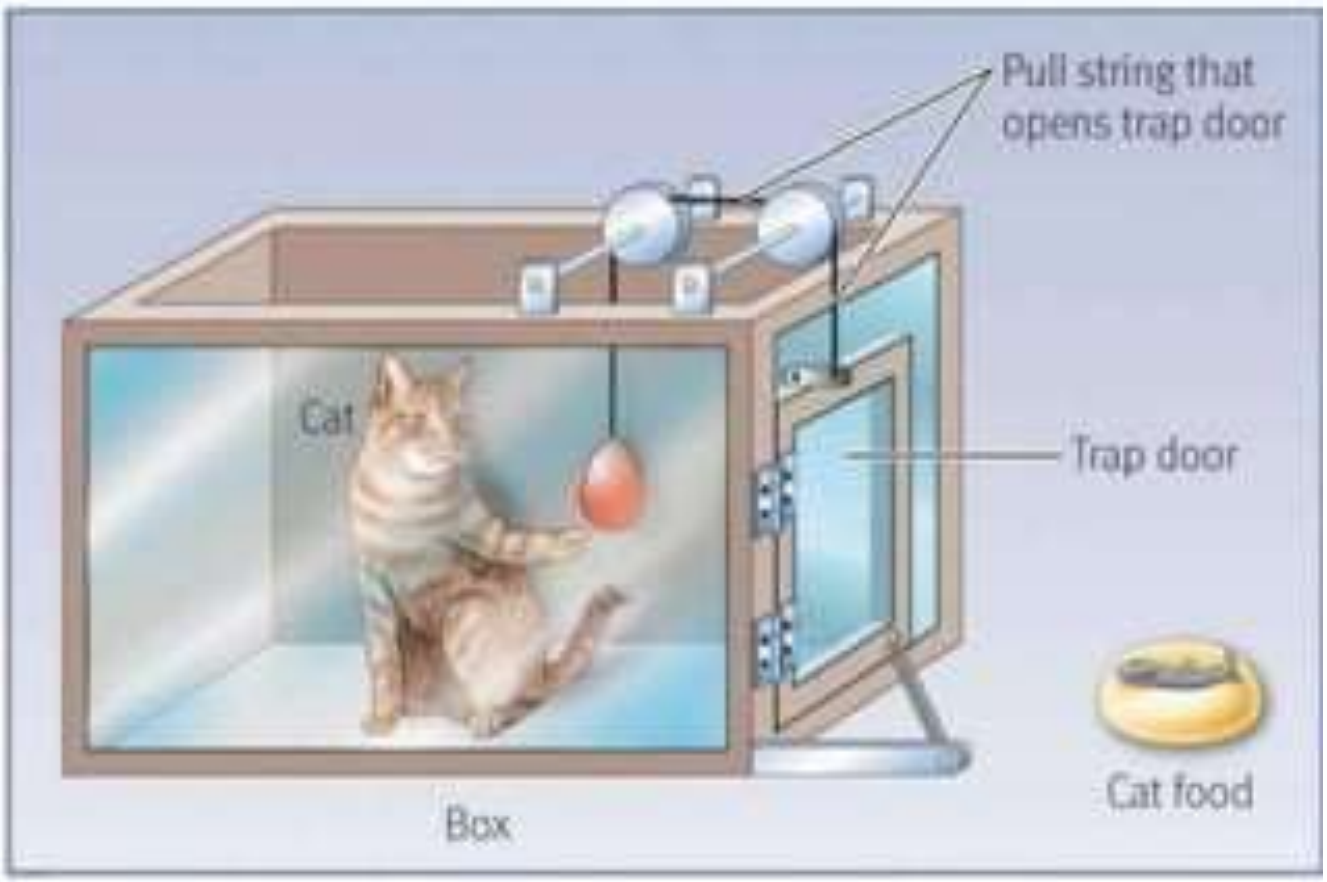
- Edward L. Thorndike was an American psychologist.
- Known for his work on animal behavior and the development of learning theories.
- His key contribution: The Law of Effect, which forms the foundation for his Trial and Error learning theory

WHAT IS TRIAL AND ERROR LEARNING?

- **Trial and Error Learning**: A process of learning where an organism attempts various responses to a problem and gradually learns which ones are successful.
- When a response is followed by a satisfying result, the behavior is likely to be repeated.
- **Learning by doing**: Repeated trials lead to more effective problem-solving.

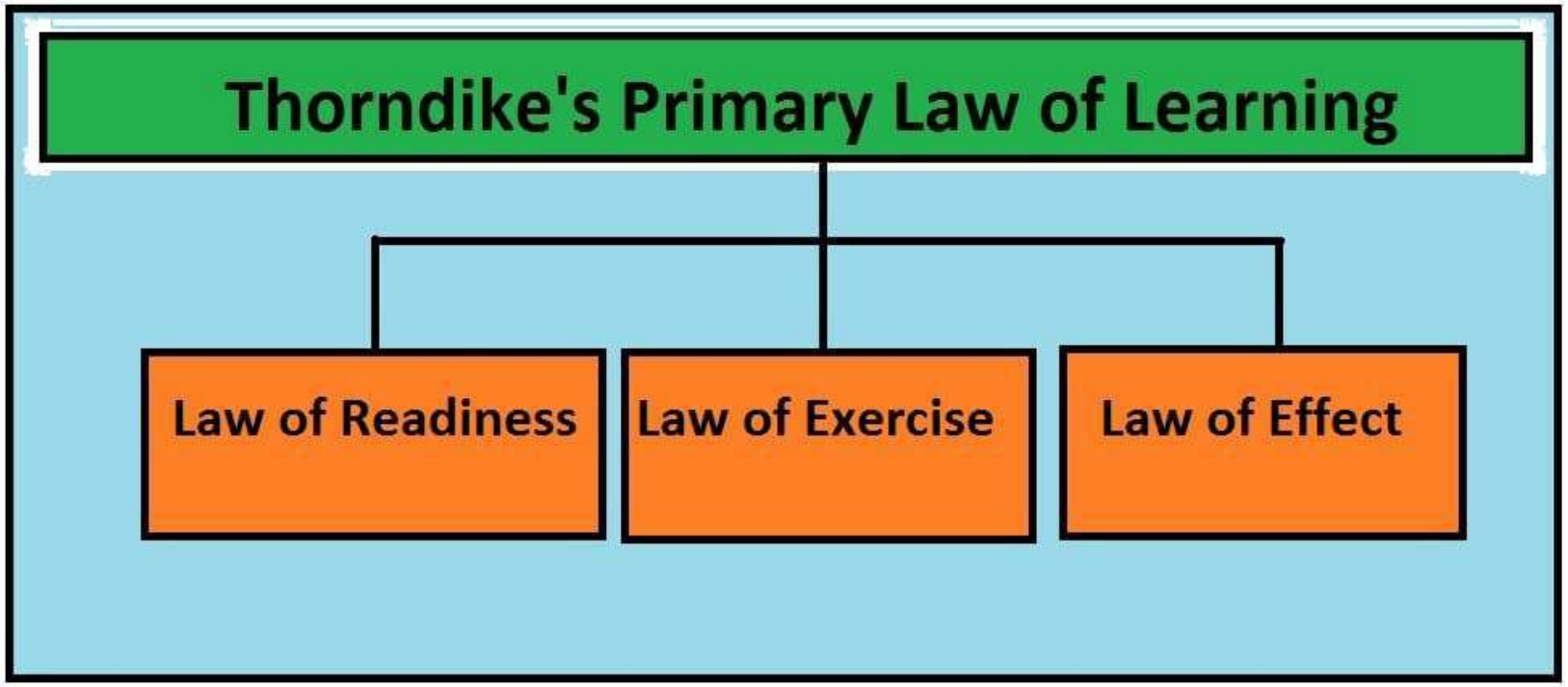
THORNDIKE'S PUZZLE BOX EXPERIMENT?

Experiment:



THORNDIKE'S PUZZLE BOX EXPERIMENT?

- **The Experiment**: Thorndike placed a hungry cat inside a puzzle box and observed its attempts to escape.
  - The cat had to figure out how to operate a lever to open the box and get food.
- **Findings**: Initially, the cat showed random behavior (trial and error).
  - After several attempts, the cat learned the correct action (pressing the lever) and the time it took to escape decreased with each trial.


Thorndike's Primary Law of Learning
Law of Readiness
Law of Exercise
Law of Effect

THORNDIKE'S PUZZLE BOX EXPERIMENT?

- **When and how the connection is accomplished was stated first in the following three laws:**

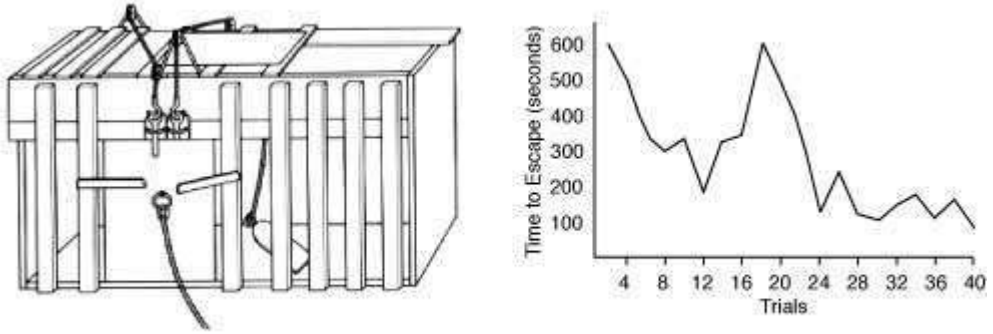
1. Law or Readiness:

- First primary law of learning, according to him, is the 'Law or Readiness' or the 'Law of Action Tendency', which means that learning takes place when an action tendency' is aroused through preparatory adjustment, set or attitude.
- Readiness means a preparation for action.
- If one is not prepared to learn, learning cannot be automatically instilled in him, for example, unless the typist, in order to learn typing prepares himself to start, he would not make much progress in a lethargic and unprepared manner.

THORNDIKE'S PUZZLE BOX EXPERIMENT?

2. Law of Exercise:

- The second law of learning is the 'Law of Exercise', which means that drill, or practice helps in increasing efficiency and durability of learning and according to Thorndike's S-R Bond Theory, the connections are strengthened with trail or practice and the connections are weakened when trial or practice is discontinued.
- The 'law of exercise', therefore, is also understood as the 'law of use and disuse' in which case connections or bonds made in the brain cortex are weakened or loosened.



Adapted from Domjan, 1993 (modified from Thorndike, 1898 [left] and Imada & Imada, 1983 [right])

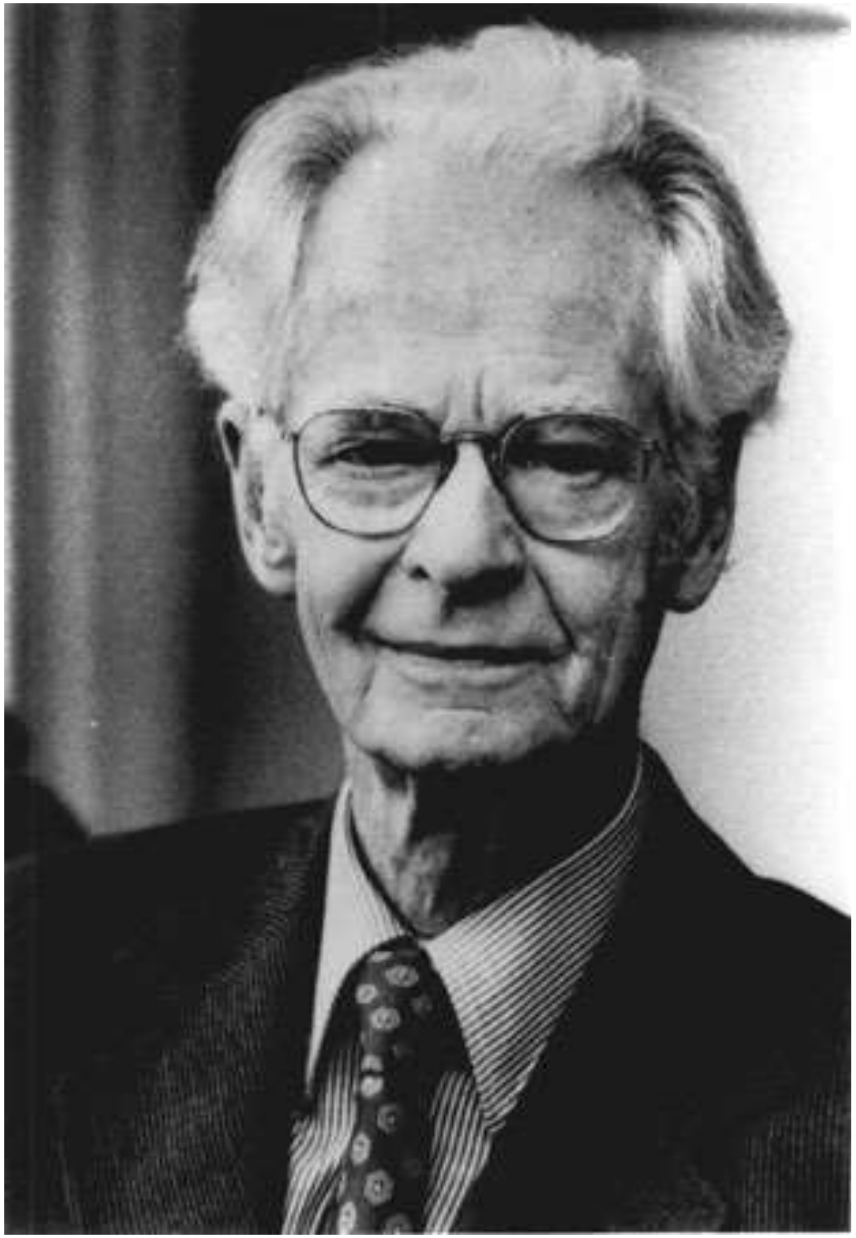
THORNDIKE'S PUZZLE BOX EXPERIMENT?

1. **3. Law of Effect:**

- The third law is the 'Law of Effect', according to which the trial or steps leading to satisfaction stamps in the bond or connection.
- Satisfying states lead to consolidation and strengthening of the connection, whereas dissatisfaction, annoyance or pain leads to the weakening or stamping out of the connections.

BEHAVIORISM

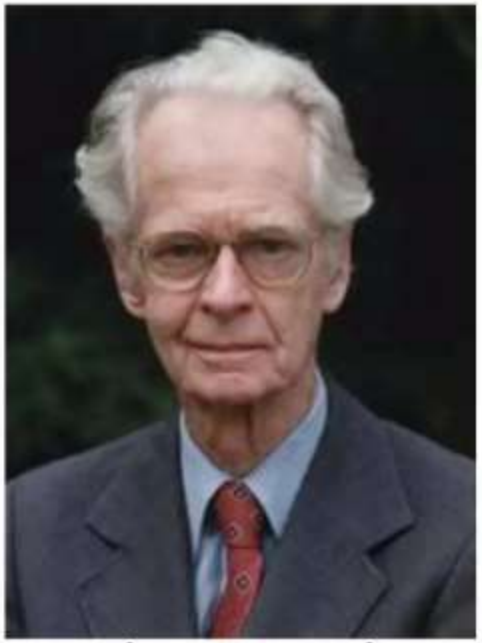
B. F. Skinner



B.F. Skinner (1904-1990)

Skinner's Operant Conditioning

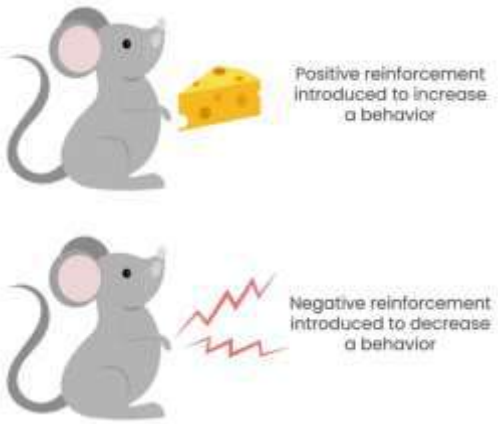
- Learning occurs through **rewards and punishments** for behavior.
- The best way to understand behavior is to **look at the causes of an action and its consequences.**
- This approach is called **operant conditioning.**



Burrhus Frederic Skinner

Operant Conditioning

- Developing an association between a particular behavior and a consequence
- Behavior which is reinforced tends to be repeated (i.e., strengthened)
- Behavior which is not reinforced tends to die out-or be extinguished (i.e., weakened).

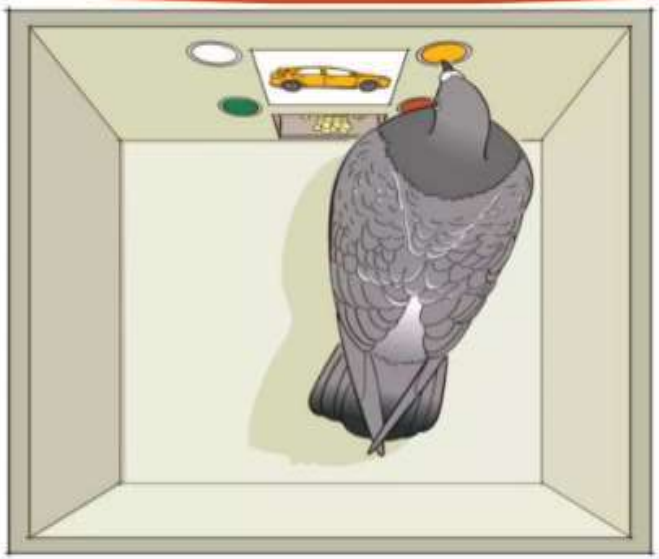


Principles in Operant Conditioning

- Behavior that is positively reinforced will reoccur; intermittent reinforcement is particularly effective.
- Information should be presented in small amounts so that responses can be reinforced ("shaping").
- Reinforcements will generalize across similar stimuli ("stimulus generalization") producing secondary conditioning.

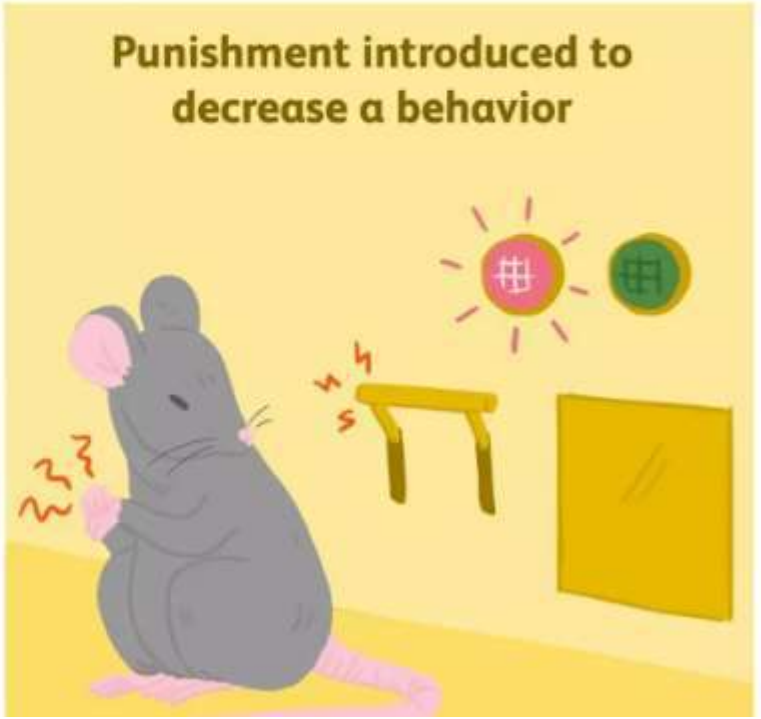
Skinner's Pigeon Box

The Pigeon Experiment



The Rat Experiment

The Rat Experiment



Types of Behaviours

Respondent behaviors

- Occur automatically and reflexively
- Need not to learn, occur involuntarily.

Operant behaviours

- Consequences of influence to occur again in the future.
- are under our conscious control.

Key Concepts

Reinforcement

- strengthens or increases the behavior it follows.

Punishment

- the presentation of an adverse event or outcome that causes a decrease in the behavior it follows.

Reinforcement

Positive reinforcers

- The favorable events or outcomes that are presented after the behavior.
- Strengthening the response or behavior by adding something.

Reinforcement

Negative reinforcers

- The removal of an unfavorable events or outcomes after the display of a behavior.
- Strengthening the response by removing something considered unpleasant.

Punishment

Positive Punishment

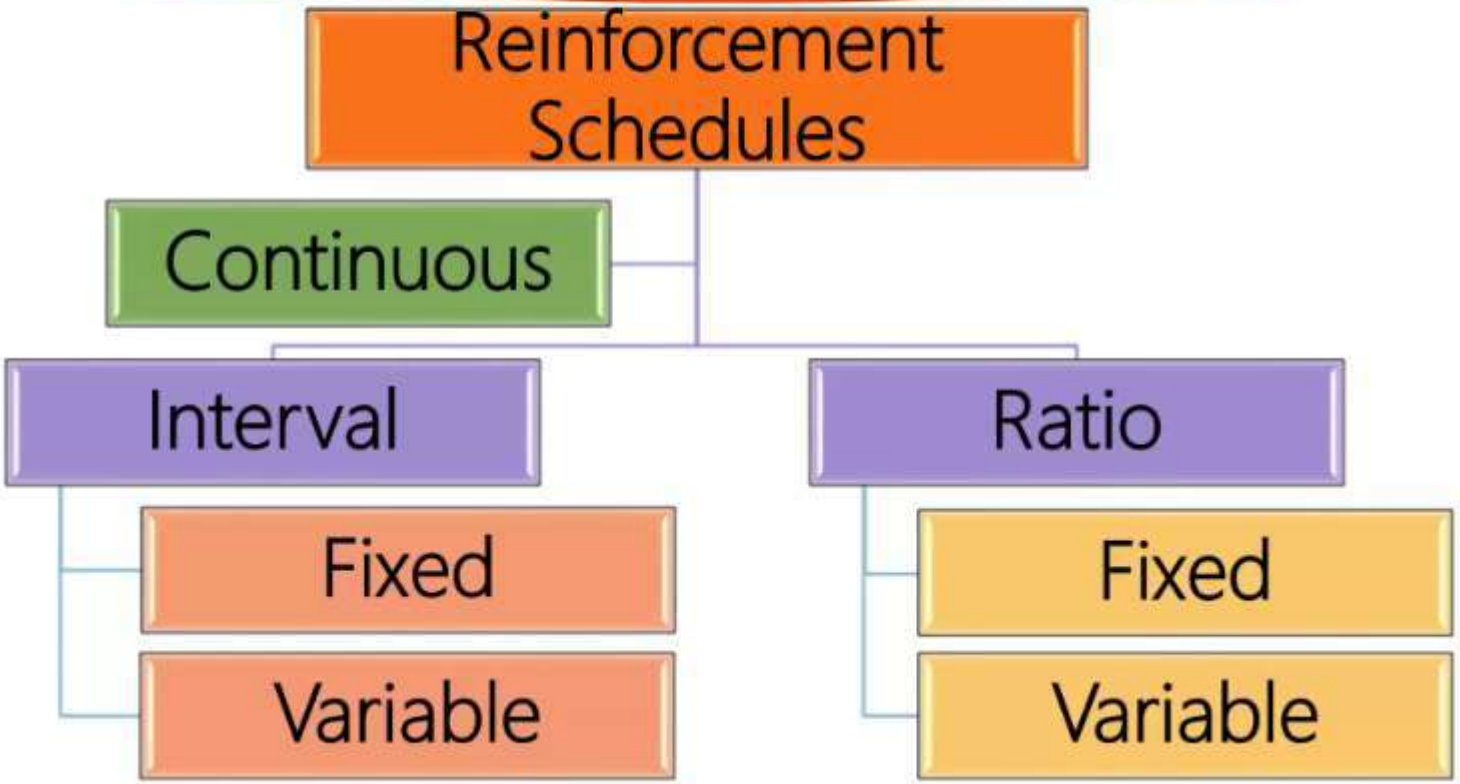
- presents an unfavorable event or outcome in order to weaken the response it follows.
- Also known as punishment by application.

Punishment

Negative Punishment

- when a favorable event or outcome is removed after a behavior occurs.
- also known as punishment by removal.

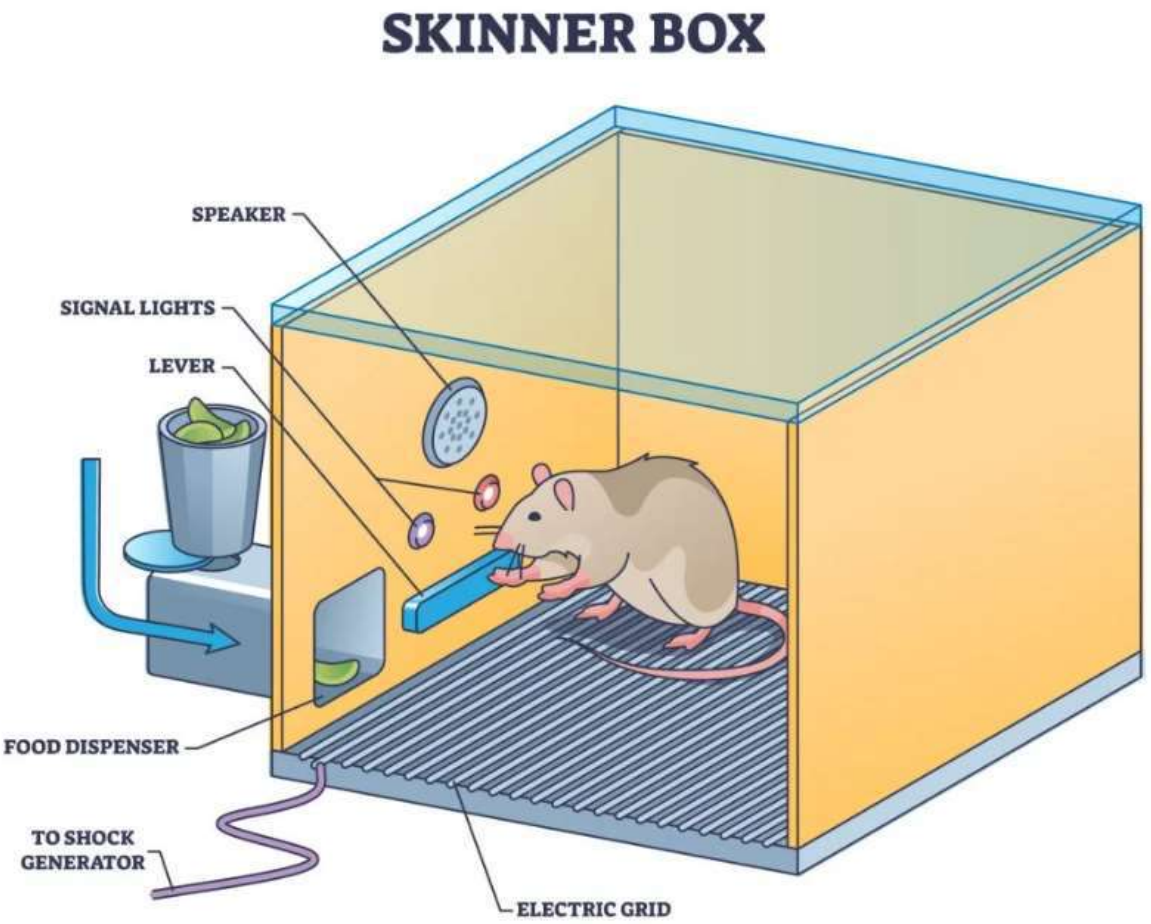
Reinforcement Schedule



Operant Conditioning: What It Is, How It Works, and Examples

- Skinner is regarded as the father of Operant Conditioning, but his work was based on **Thorndike's (1898) Law of Effect**. According to this principle, behavior that is followed by pleasant consequences is likely to be repeated, and behavior followed by unpleasant consequences is less likely to be repeated.
- Skinner introduced a new term into the Law of Effect – Reinforcement. Behavior that is reinforced tends to be repeated (i.e., strengthened); behavior that is not reinforced tends to die out or be extinguished (i.e., weakened).
- Skinner (1948) studied operant conditioning by conducting experiments using animals, which he placed in a "***Skinner Box***," which was similar to Thorndike's puzzle box.

Operant Conditioning: Experiment



Operant Conditioning: Experiment

- **How a Skinner Box Works**
- The design of a Skinner box can vary depending upon the type of animal and the experimental variables. It must include at least one lever, bar, or key that the animal can manipulate.
- When the lever is pressed, food, water, or some other type of reinforcement might be dispensed. Other stimuli can also be presented, including lights, sounds, and images. In some instances, the floor of the chamber may be electrified.
- The Skinner box is usually enclosed, to keep the animal from experiencing other stimuli. Using the device, researchers can carefully study behavior in a very controlled environment. For example, researchers could use the Skinner box to determine which schedule of reinforcement led to the highest rate of response in the study subjects.

Operant Conditioning: Experiment

- A Skinner box, also known as an operant conditioning chamber, is a device used to objectively record an animal's behavior in a compressed time frame.
- An animal can be rewarded or punished for engaging in certain behaviors, such as lever pressing (for rats) or key pecking (for pigeons).

Operant Conditioning: Experiment

- Skinner identified three types of responses, or operant, that can follow behavior.
- **Neutral operants:** Responses from the environment that neither increase nor decrease the probability of a behavior being repeated.
- **Reinforcers:** Responses from the environment that increase the probability of a behavior being repeated. Reinforcers can be either positive or negative.
- **Punishers:** Responses from the environment that decrease the likelihood of a behavior being repeated. Punishment weakens behavior.
- We can all think of examples of how reinforcers and punishers have affected our behavior. As a child, you probably tried out a number of behaviors and learned from their consequences.

Applications and Criticism of Operant Conditioning

- **Education**: Using positive reinforcement (e.g., rewards for correct answers) to encourage learning.
- **Parenting**: Reinforcing good behavior (praise or treats) and discouraging bad behavior (timeouts).
- **Animal Training**: Teaching animals tricks through reinforcement.

Criticisms of Operant Conditioning

- **Overemphasis on external rewards**: May ignore internal motivations and feelings.
- **Ethical concerns**: Use of punishment could be seen as manipulative or harmful.
- **Limited focus on cognitive processes**: Does not address the role of thoughts or understanding in behavior.

Applications and Criticism of Operant Conditioning

- Schedule and control the learning process by encouraging in advance
- Positively reinforcing modification of behaviour as desired
- Motivation is the best mean to generate desired learning and success in performance.
- Proper development of personality
- Rejects use of punishment to correct bad habits.

Conclusion

- Operant conditioning is a powerful tool for understanding and shaping behavior.
- It has practical applications in education, parenting, and behavioral therapy.
- Though not without its criticisms, it remains a significant theory in the study of psychology.