# Learning

- Why do some of us learn to be afraid of spiders?
- How do we learn to be diligent and disciplined with some Professors?

# Goals

- Learn how we modify behaviour, skills and acquire knowledge.

# Learning

- A relatively permanent change in behavior brought about by experience or as a result of practice
  1. Change in behavior (better/worse)
  2. Changes due to practice and experience (not changes due to growth and maturation)
  3. The change should be relatively permanent

# Behaviorsim and behavior analysis

- Learning has roots in Watson's work.
- Rejected introspection and contents of sensation, images and feelings as subject matter of psychology.
- Emphasized the study of observable behavior.
- Skinner later formulated radical behaviorism.
- Evolution provides us with a repertory of behaviors and all behavior beyond that is learned.

- Skinner emphasized causes of behavior do not lie in inner states or mental events but lie in environmental stimuli.
- Behavior analysis attempts to discover environmental determinants of learning and behavior.
- All animal species posses the elementary processes of learning.

- Classical Conditioning, Pavlov (1849-1936)
  also called Pavlovian Conditioning
  - In classical conditioning two stimuli are presented to the learner
  - A neutral stimulus gradually brings a response after it is paired with a stimulus (e.g., food) that naturally brings about that response

- Pavlovian Experiment
  - Bell ringing – neutral stimulus
  - Food (Meat) – Unconditioned Stimulus (UCS)
  - Food leads to salivation the Unconditioned Response (UCR)

  Gradually after learning happens, salivation in response to the bell ringing – Conditioned Response (CR)

  Bell ringing → Conditioned Stimulus (CS)

- Core of Classical Conditioning are reflex responses- an unlearned response such as salivation, pupil contraction, eye blinking.
- These are naturally elicited (evoked) by stimuli, biologically relevant.
- These do not require learning for the stimulus to control the behavior.

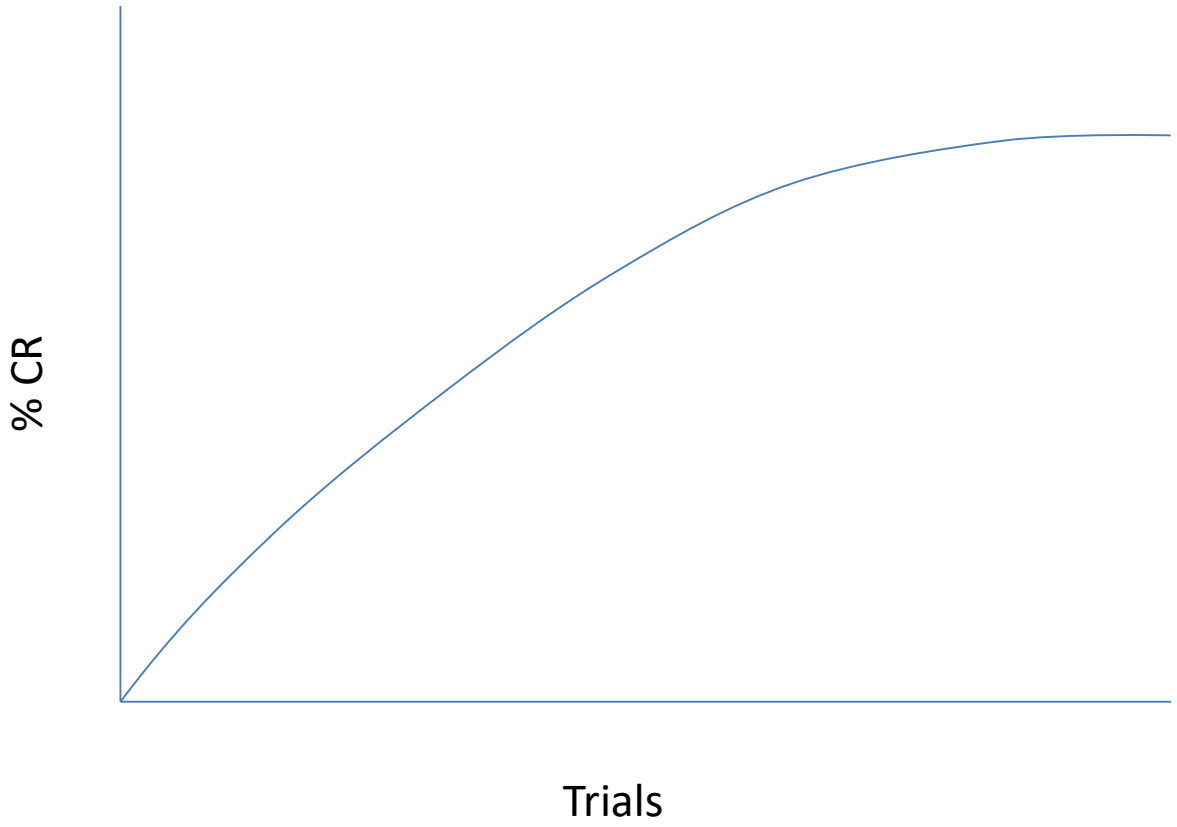
- On the first conditioning trials
  - The CS and UCS are paired but no conditioning has yet occurred
- Stimuli Response

  CS followed by UCS → UCR

  ----------Repeated Pairings----------
- Test trial after repeated pairings
  - CS presented alone
- Stimuli Response

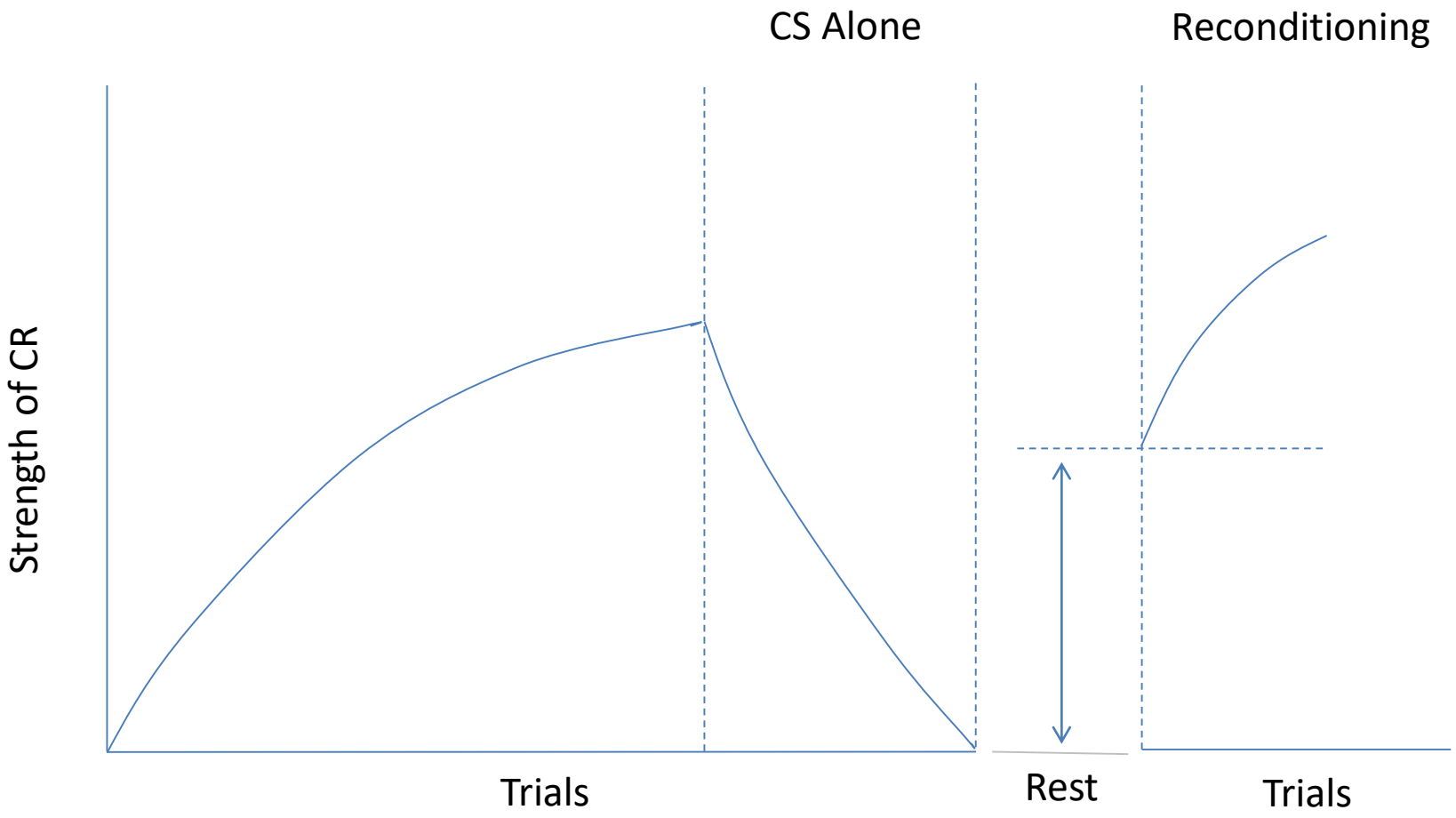
  CS → CR

# Course of Conditioning



Some more concepts

- Extinction
  - Occurs when in classical conditioning CS is presented alone without the UCS for a couple of trials.
  - The CR gradually decreases and finally stops
    Extinction is not forgetting
  - After rest when CS is again presented CR occurs- Spontaneous recovery.
  - Reconditioning is quicker.


CS Alone
Reconditioning
Strength of CR
Trials
Rest
Trials

- Stimulus Generalization
  - The subject tended to generalize the conditioned response to other stimuli that are somewhat similar to the original conditioned stimulus
    Similarity ↑ Generalization ↑
- Stimulus Discrimination
  - Learning to make one response to one stimulus and no response or another response to another stimulus.
- Balance required between the two, allows creatures to react efficiently to their environments

- The presentation of CS and UCS must be close in timing. Different temporal patterns have been used.
  - Delay conditioning, where the CS comes on prior to the UCS and stays on at least until the UCS is presented.
  - Trace conditioning, where the CS is discontinued before the UCS is presented.
  - Simultaneous conditioning, where both CS and UCS are presented together.
  - Backward conditioning when CS is presented after the UCS.

# Theories of Classical Conditioning

- Stimulus Substitution- CS
  - Simply as a result of pairing with a UCS, acquires the capacity to substitute for a UCS in evoking response

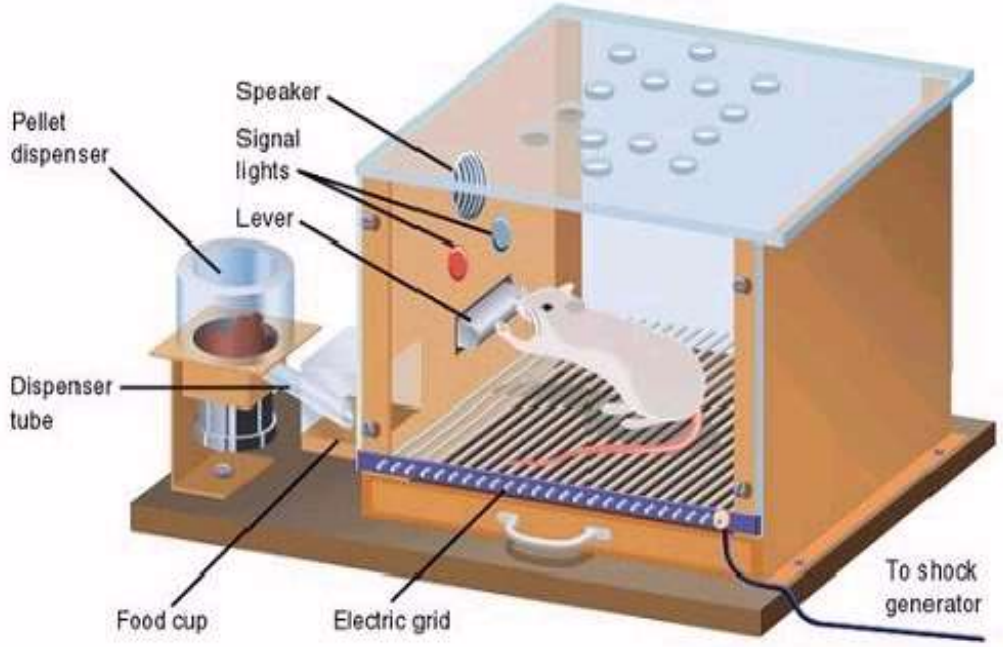
    CR is not the same as UCR
- Information and expectation
  - CS becomes a signal for the UCS thus the learner responds with this expectation.
  - A CS should be intense and contrast with other stimuli.

- Significance of Classical Conditioning
  - Our violent emotions to subtle moods – all could be conditioned
  - Learned very quickly
  - Behavior  Modification therapy

# Operant Conditioning/Instrumental Conditioning

- Some action of the learner is instrumental in bringing about a change in the environment that makes the action more or less likely to occur again.
- Thorndike gave the Law of effect- behavior and its consequences.
- Skinner developed a Skinner box (pigeon taught to peck a key to get food).
- An operant is any behavior that is emitted by an organism & can be characterized in terms of observable effect on the environment.

- Learning occurs as an association between stimuli in the situation and a response that an animal learned to make. S-R connections
- Cat learned to produce an appropriate response (pressing a lever) in the stimulus circumstances(confinement in a puzzle box) that led to a desired outcome (Consequence)


Speaker
Pellet dispenser
Signal lights
Lever
Dispenser tube
Food cup
Electric grid
To shock generator

- Reinforcers- An environmental event that is the consequence of an instrumental response more likely to occur again
  - Positive reinforcer is a stimulus or event which when it follows a response **increases** the likelihood of it occurring again.
  - Negative reinforcer is a stimulus, the cessation or termination of which when contingent on a response, **increases** the likelihood that the response will occur again.

- Punishment - Different from negative reinforcers. A stimulus the onset of which when contingent on a response **decreases** the likelihood that the response will occur again
- Omission training (Negative punishment) – Positive reinforcement is withdrawn following a response. The effect of the omission of the reinforcement is **to decrease** the likelihood of the response which led to the removal of the positive reinforcement.

- 3 classes of stimuli
- Some that you are neutral to.
- Appetitive stimulus- you have an  appetite for them.
- Aversive stimulus- you seek to avoid them.

Not the same for all individuals.

- Negative reinforcers are generally noxious events or a painful experience
  - Escape learning- escaping an aversive stimulus.
  - Avoidance learning- Avoiding a noxious stimulus

| Types of Reinforcement and Punishment | | |
|---|---|---|
| | EFFECT ON BEHAVIOR | |
| Procedure | Increases | Decreases |
| Presentation of Stimulus | *Positive reinforcement:*<br>*Example:* Giving a raise for good performance<br>*Result:* Increase in frequency of response (good performance) | *Positive punishment:*<br>*Example:* Giving a spanking following misbehavior<br>*Result:* Decrease in frequency of response (misbehavior) |
| | | |
| Removal of Stimulus | *Negative reinforcement:*<br>*Example:* terminating a headache by taking aspirin<br>*Result:* Increase in frequency of response (taking aspirin) | *Negative punishment:*<br>*Example:* Removal of favorite toy after misbehavior<br>*Result:* Decrease in frequency of response (misbehavior) |

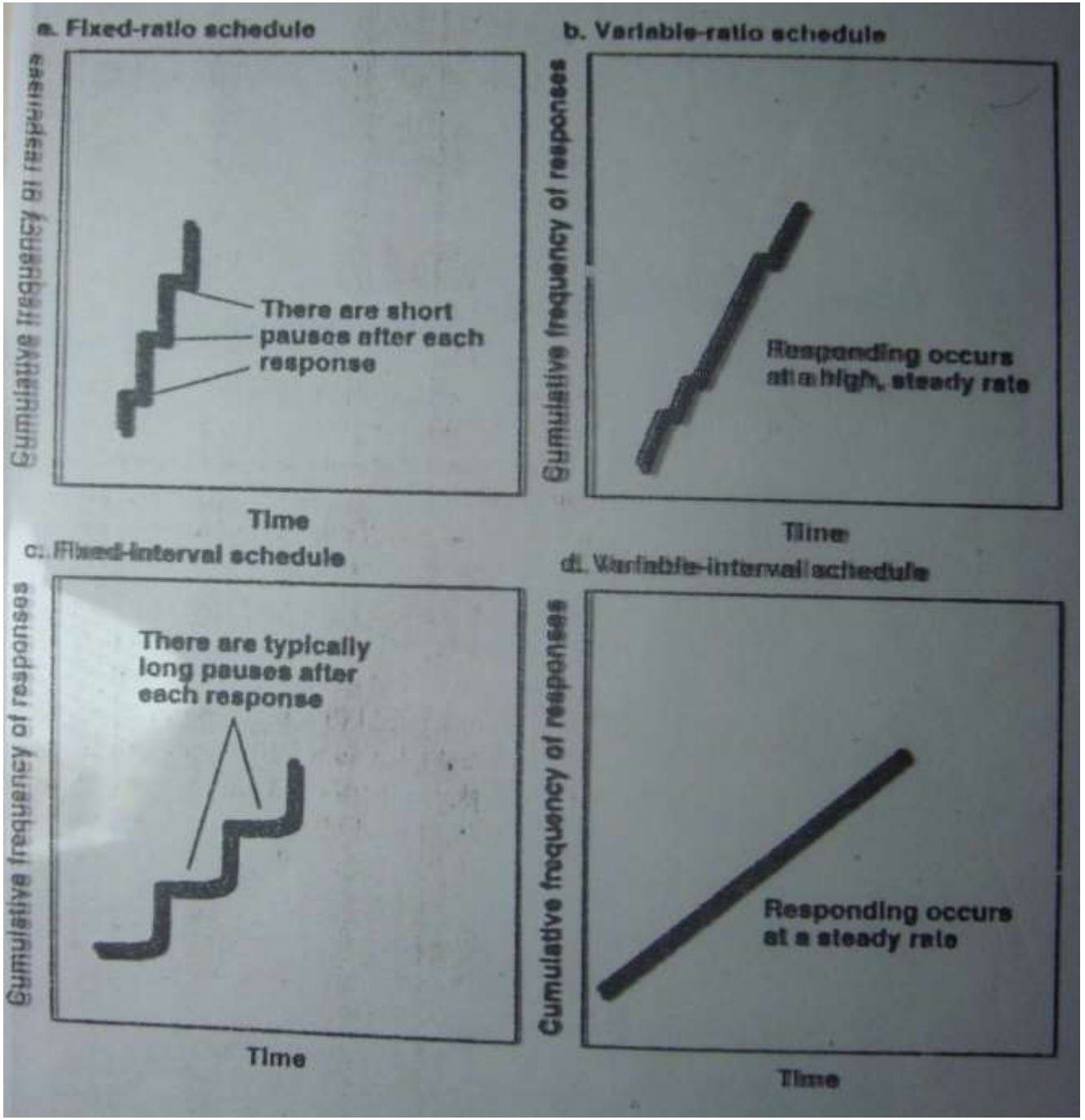
# Operant conditioning in your life

| | Appetitive Stimulus | Aversive Stimulus |
|---|---|---|
| Deliver | **Positive Reinforcement** | **Positive punishment** |
| Remove | Negative Punishment | Negative Reinforcement |

# Properties of reinforcers

- Primary Reinforcer – Satisfies some biological need, works naturally- food, water, shelter etc.
- Secondary Reinforcer (conditioned reinforcer) – Becomes reinforcing because of association with a primary reinforcer. Praise, encouragement, money.

- Schedules of reinforcement
  - Fixed-Ratio Schedule – The response must occur a certain number of times before reinforcement occurs
  - Fixed-Interval Schedule – No reinforcement until a certain interval of time elapsed
  - Variable-Ratio Schedule – Subjects are reinforced after a variable number of responses
  - Variable-Interval Schedule – Time intervals between responses that are reinforced is variable




Outcome of Different Reinforcement Schedules

- Rate of Learning in Different Schedules of Reinforcement
  - FR – A pause in responding after each reinforced response and then a rapid run until the next reinforcement response
  - FI – Long pause and gradual acceleration of responding
  - VR and VI – generate a steady rates of response

- Stimulus generalization
  - If the stimulus situation is changed the response still occurs but less readily than it did in the original stimulus situation
- Stimulus Discrimination
  - A process of learning to make one response to one stimulus and another to another stimulus (achieved by simply by reinforcing a particular response to one stimulus and not reinforcing the same response to another stimulus)

- Shaping – Method of successive approximations (Reinforcing the steps that lead to the desired response and that response eventually occurs)
- Operant Extinction- Behavior does not produce predictable consequences it returns to the level before conditioning.

- When punishment works?
  1. More intense punishment is effective, in human it can lead to strong emotional conditioned responses/will be developed (mild punishment is the best in the long run)
  2. Consistent punishment should be administered
  3. Contingent upon the occurrence of some response
  4. Stronger the response tendency less effect punishment (mild) would be
  5. People and animals adapt to punishment
  6. Positive reinforcement should be given along with punishment

- Use of punishment
  - When a child does something which can be dangerous – strong punishment should be used
  - Should be given immediately in response to the behavior
  - Simple explanation should follow
  - While punishing for incorrect behavior is important to positively reinforce alternative behavior

  Do not use punishment as the only means of controlling behavior

- Uses of Instrumental Conditioning
  - Our beliefs, customs, and goals may be learned by instrumental conditioning.
  - Child is socialized- unknowingly reinforcing certain behaviors.
- Positive reinforcement used in organizations to increase employee productivity
- Used for behavior modification
  1. Quitting habits like smoking
  2. Helping mild-mannered people to be more assertive
  3. Treating psychological disorders.

*Behaviors are maintained because they get attention and sympathy*

# Species- specific tendencies

- Operant conditioning experiment (Breland& Breland, 1951) a racoon required to pick and deposit a coin.
- Would rub the coins, dip them in toy bank and pull them out.
- Not all aspects of learning under the control of the experimenter. Biological constraints exist.
- Species-specific tendencies overide changes in behavior brought  by operant learning.

# Taste/Food aversion

- On consuming any substance if it makes one ill we do not consume that substance again.
- Instance of classical conditioning more powerful than others, even one pairing- taste aversion is learned.
- Despite a long interval of 12 hrs.
- Biological preparedness – a particular species has evolved so that members of the species require less learning experience than normal to acquire a CR.

- Application of the laws of learning must take into account the characteristics of both learner and the reaction being learned
- Prepared behaviors – Predisposed to learn some things easily (e.g., learned flavor aversion)
- Unprepared behavior – Can be learned with moderate amount of difficulty
- Contraprepared behavior - learned with great difficulty

# Cognitive Learning

- Experiments on rats in a maze  by Tolman indicated they had a cognitive map.
- Cognitive Learning is a change in the way information is processed as a result of experience a person or animal has had
  - Due to experience the meaning and significance of the events changes
  - New associations are formed and stored in the memory

- Cognitive learning involves forming the perceiving of new relationships among events (cognition is the processing of information about the environment received from the senses). They involve:
  1. Selection of information
  2. The making of alteration in the selected information
  3. The association of items of information with each other
  4. Elaboration of information in thought
  5. Storage and retrieval from memory

- Latent learning – Learning which occurs but is not evident in behavior until later, when conditions for its appearance are favorable
  - Occurs without reinforcement of particular responses
  - Changes in the way information is processed
  - Eg : Cognitive Maps

- Insight Learning – A person is posed with a problem, a period of time follows in which no apparent progress is made and then the solution comes suddenly
  - ‘Aha’ experience
  - For sometime zero learning on the curve and all of a sudden the learning is complete
  - Great deal of generalization
  1. Solution comes suddenly
  2. Perceptual rearrangement helped
  3. Solution once arrived can be generalized a lot

- Imitation Learning/ Observational learning by Bandura  occurs when we imitate another individual called a model (4 steps):
  1. Paying attention and perceiving the behavior
  2. Remembering the behavior
  3. Reproducing the action
  4. Being motivated to learn and carry out the behavior

*Applied to studies of aggression learned from TV*