LECTURE 12
PSYC 200
FEB 17TH

Accidental Reinforcement

- example: lets say you show up to class and write a test and do well in the test, you didn't study well but you got a good grade and you wrote it with a red pen, on different test date you will bring a red pen (good luck)\
- another word for this is superstition, you can create this type of behaviour (B.F Skinner and his hungry pigeons)
- http://pennvetwdc.org/terminology/accidental-reinforcement/

Attractive Rewards and Reward Expectations

- does the size of the reward influence the behaviour? answer is both yes and no, only after the original reward has been changed
- reward contrast effect: you pay a kid 20$ to shovel driveway, then eventually you tell him you will only give him 10$, he will not be motivated and will probably quit, the opposite is also true, desire to work/perform will be increased if you increase reward
- token economies: rewarding desired behaviour, examples of behaviour could be: taking shower everyday, keeping room clean, etc., **token payoff**
- premack principle: states that a preferred activity can be used to reinforced a non-preferred activity
    - example: lets say your preferred activity is movies and non-preferred is studying, according to this principle, you can use preferred activity to reinforce non-preferred activity, "you can go to the movies if you study first"

Punishment and shaping

- punishment: decrease likelihood of given behaviour to occur
- can we use operant conditioning to learn a variety of behaviours? yes, using shaping (below)
    - shaping: we use rewards/reinforcements to guide an organism's actions towards the desired behaviour
- successive approximations: we reward the actions that bring the organism closer to the desired behaviour
    - example: to get a rat to push the button, you have to guide the rat;s actions for it to press the button, overtime the rat faces the button, you drop pellets of food, rat will figure out that if it faces the button it will be given food, as it moves towards the button, it gets more food
- chaining: you start in the end and work your way backwards
    - example: place the rat in front of the button and drop food, stop giving it food until it backs
    - not as effective as the forward chaining method
- using positive reinforcement: desired behaviour is followed by a rewarding stimulus, behaviour is more likely to happen again
- using negative reinforcement: desired behaviour is followed by the removal of something unpleasant, behaviour is more likely to happen again
    - example: removing chores will reinforce positive behaviour
- using positive punishment: an undesired behaviour is followed by the presentation of an unpleasant stimulus
    - example: getting a speeding/parking ticket, your undesired behaviour was speeding, to decrease likelihood of its occurrence, you are presented with a ticket (a punishment)

- using negative punishment: an undesired behaviour is followed by the removal of a pleasant stimulus
    - example: curfew, if you are not home by curfew, your parents take away your cellphone/ don't allow you to go out

Applications of Operant Conditioning
- does operant conditioning work in real life? yes and no
    - Skinner's theories were highly controversial: he was criticized for dehumanizing individuals by rejecting their freedom
    - behaviour is shaped by your environment, neglecting free will
    - you are not solely influenced by your environment, you can also influence your environment, it works both ways
- Under what conditions does operant conditioning best work?
    - works best when there is least delay between behaviour and reinforcement/punishment
        - example: when you try to train a dog to go outside to poop and they don't obey, you punish it (lightly hit with newspaper) right away, this is not effective if you react an hour later, dog will not understand
    - it can also fail, example is prisons, if you punish criminals, they will not repeat undesired behaviours
    - biggest failure of operant conditioning is the death penalty, it is not a deterrent

Observational Learning
- Adrian Cole (2005): he was pulled over by the cops in the middle of the night going to the video store, he was four years old
    - we don't directly experience many of the behaviours we learn/display, we learn by observing others
    - example: watching youtube videos for workout exercise and repeating the same movements at the gym
- observational learning: the process by which we learn things by observing, and imitating the behaviours of others

Elements of Observational Learning
- Stimulus enhancement: we tend to pay attention to things or places that others show an interest in
    - if your friends play a sport, you will play it too
- Goal enhancement: we are more motivated to act out behaviours that have been rewarded in the past
    - example: timmy goes to piano lessons and after, his mom takes him to get ice-cream, he will continue displaying this behaviour because he wants ice-cream
- Modelling: the ability to reproduce the action being observed
    - example: the younger sibling will see the older sibling using cutlery and he/she will try to imitate
- Latent learning: acquiring information for later use
    - example: abused children will most likely be abusive to their own children in the future

Bandura's Experiments
- he put observational learning on the map, he was interested in how children are influenced by adult behaviour, interested in how adult behaviour can shape a child's behaviour by simple observation

- bobo the clown (https://explorable.com/bobo-doll-experiment): the bobo doll experiment was performed by Bandura to try and add credibility to his belief that all human behaviour was learned through social imitation and copying rather than inherited through genetic factors

Applications of Observational Learning
- antisocial models: negative models that can create negative behaviour
    - link between violence on TV/video games and aggressive behaviour in children
- prosocial models (Martin Luther King, Gandhi): positive models that can create positive behaviour
    - they use their influence to trigger social change through non-violent actions

Learning based activities
- play: serves as a natural training for behaviours, this type of training is used/applied in more serious settings later on
    - a kitten playing may seem cute but it is technically practicing its hunting skills for later use in adulthood
- exploration: triggered by two things: fear and curiosity
        - example: a rat exploring its cage, checking it out and looking out for where things are and how they're placed
    - patrolling: an organism patrols to make sure that nothing has changed in its environment

Learning in the Brain: Lashley
- Mass action principle: the learning deficit that organisms show was proportional to the size of the brain area removed, did not matter where the lesion was done
- law of mass action: the efficiency of learning is a function of the total mass of cortical tissue. larger areas of the brain used in learning that localizationalists would suggest
- principle of equipotentiality: the idea that one part of the cerebral cortex is essentially equal to another in its contribution to learning

Learning in the Brain: Hebb
- what process takes place in the brain when we learn?
    - long-term potentiation (LTP): learning new information to strengthen connections in the brain, learning is associated with neural activity, changes in the brain occurring, for info to be remembered later the connections in brain have to be strengthened
    - memories are enhanced connections between neurons, the more you use these memories the stronger the connections become, "use it or lose it"
- Long term depression: weakening of LTP
- **<u>what strengthens and weakens LTP? Stimulation (TEST QUESTION)</u>**

Consolidation in Learning

- how do we retain what is learned? learning (strengthening of new connections) is a lot difficult following long periods of wakefulness, it is hard if you are tired, sleep is very important, strengthening takes place in REM sleep, sleep deprivation leads to the depletion of proteins that help neurons grow and survive in hippocampus
    - memory consolidation: there are two types known as synaptic consolidation and system consolidation
        - synaptic consolidation: takes place a few hours after learning, involves both structural and physiological changes the are necessary for the creation of memory trace
        - system consolidation: gradual process, takes weeks/months after learning, involves the reorganization of brain areas that support memory
            - It is a change that is necessary for the transfer of information into long-term memory
        - this is taking place in the hippocampus (area-specific), parietal lobes and temporal lobes (general)
        - new info (not all) is stored in hippocampus, usually stays in there for 2 years (synaptic consolidation), after this it is moved to other areas of the brain (system consolidation)
- Ribot's law: any sort of brain damage you will sustain will affect recent memories more so than distant/remote memories **TEST QUESTION**
    - why? most of your recent memories have yet to be fully consolidated/strengthened **TEST QUESTION**
- Cognitive maps: a way of explaining what goes on in the hippocampus, one idea that has been proposed is that hippocampus is involved in spatial learning, this has led to the theory of cognitive maps
    - theory states that the hippocampus allows us to create memories of our surroundings, theory is supported by the idea that hippocampus is made up of place cells
    - place cells: only become active when organism is in a specific location, problem with this is that you would need ALOT of place cells to remember every single location you've visited
    - relational memory theory: researchers said that cells in hippocampus work by linking events together and the combination of these events will create a memory

Learning in the Brain

- remember that brain changes whenever you learn something
- takes place in somatosensory cortex, basal ganglia (motor learning), amygdala (emotional learning), cerebellum (learning skills/habit), hippocampus
    - somatosensory cortex: put hand in your pocket and you feel your keys, you know that because you've learned to identify that object through touch
    - basal ganglia: operant conditioning learning, also associated with reinforcement and punishment, ability to learn certain motor skills is highly dependent on basal ganglia (swinging golf club, learning to write)
        - primary goal: helping learn the proper selection of appropriate responses, every time you select an appropriate response, areas in the brain are rewarded by secretion of dopamine (neurotransmitter), connections associated with specific motor response become strengthened because of extra neurotransmitters and this increases likelihood that this response will occur again
    - cerebellum: plays important role in delayed conditioning (pavlov and his dogs), formation of certain habits and skills (learning to ride a bike, tie your shoes)
- behavioural component: involves brainstem
- physiological component of fear response: sympathetic nervous system

- cognitive component: feelings of fear, cerebral cortex
- these three components are controlled by the amygdala

Learning in the Brain

- other neural mechanisms
    - mirror neurons: responsible for being able to learn by watching others, "monkey see, monkey do"
        - they become all excited when you are watching someone do something
        - example: every time you use a hammer, a part of your motor cortex is activated, when you watch someone use a hammer, it will activate the same area
        - how to swing golf club: you watch youtube videos to learn, which activates areas in your brain and strengthens them