

## LECTURE 1 NOTES:

Psychology definition: scientific study of how we think , feel and behave

Scope of psychology : every aspect of human life, bar none is of relevance

Why do we need it?

Limits of intuition ... we cannot rely

Why can't we rely?

-sometimes we rely on intuition, gut feeling sometimes works out but sometimes does not

- we cant rely on the natural world

- Limits of common sense : common sense is not so common

-

Descriptive vs inferential stats = 2 main type of statistics

Stats- describe & draw conclusions

Descriptive = allow researchers to organize, summarize & describe in a meaningful clear precise and concise way

Ex. Percentages,

Histograms/bar graph - details PAY ATTENTION, inferential we can draw conclusions ,

\*\*regression towards the mean & psychology research ethics (2 questions) \*\* midterm point

## LECTURE - chapter 2

### Chapter 2- the biology of mind

The nervous system

-function & structure : NS = 2 main divisions

- 2 divisions are central and peripheral nervous system

- CNS ( brain, spinal cord)

- PNS ( all the nerves in your body that are outside of the CNS)

- Constantly working together

- Communication network - think of the nervous system as this

- Receives messages from the environment, organizes and analyze/ integrate / interpret this information & uses this info to send messages to muscles & glands

- NS is responsible for our conscious experience (being aware of ourselves & our environment)

- NEURONS: basic function & structure : neurons are the basic unit of communication in the nervous system
  - communication between neurons is an electrochemical process, when a neuron communicates - it fires ( produces an electrical impulse) which is called an action potential. Ultimately, this action potential is going to lead to the release of neurotransmitters.
  - What are neurotransmitters? Chemicals that neurons use to deliver their messages

3 types of neurons - 1) sensory neuron : collect & receive info from environment, they send this info to the CNS 2) interneurons, are the ones that are going to analyze the info, organize/integrate and interpret the information collected by our senses, FOUND ONLY IN THE CNS , only communicate with other neurons, interneurons OUTNUMBER all other neurons 3) Motor neurons = receive orders of interneurons and deliver those orders to muscles ,etc .

Neurons come in a variety of shapes and sizes . Neurons differ but always have the same basic structure.

Cell body/ soma - nucleus inside ... everything the neuron needs is manufactured by the soma

dendrites = branch out of the soma , they receive info from other neurons , they expand surface area of the neurone without taking up much space,

Axon- participates in communication , carries electrical impulse/action potential / transport impulse all the way down to the terminal buttons,

Terminal buttons- release neurotransmitters  
Axon branches

Myelin sheath - white fatty like substance that traps around SOME of the axons in the nervous system.

Provides info.. speeds up transmission of information. Axons that are covered by myelin sheath transfer info much faster than ones not covered.

Healthy myelin sheath is important, if it is not in tact it could alter our transmitting

Synapse- where the neurons meet to communicate, and exchange information (terminal button & dendrite meet and communicate)

Synaptic cleft or gap- tiny space- they neurons are not really touching at the synapse

Presynaptic neuron- neuron that is sending out the message

Postsynaptic neuron- neuron that is receiving the message

Every single neuron can connect to thousands of other neurons

## COMMUNICATION (of neurons)

Within a neuron :

-Brain is 80 percent water

-fluid in our brain has dissolved chemical such as  $\text{Na}^+$  sodium ions , chloride ions  $\text{Cl}^-$  ,  $\text{K}^+$  potassium ions, these are found inside and outside the neuron

-they are found in different concentrations, and the concentrations of the ions are going to change and vary

-when the neuron is at rest= means the neuron is not firing, not communicating, its not sending signals, it is 'at rest'

- When at rest, higher concentration of NEGATIVE ions INSIDE neuron
- When at rest, higher concentration of POSITIVE ions on the outside of the

neuron

- Electric charge inside neuron is negative, and outside is positive when at rest
- Minus  $-70\text{mv}$  (charge inside the resting neuron)
- Membrane of the neuron is polarized
- Even at rest the neurons receive messages from other neurons
- 2 major types of messages in neurons: inhibitory messages & excitatory

messages

- Inhibitory messages: these are messages that instruct the neuron NOT to fire, tell the neuron do not fire, do not communicate \* these messages change the concentration of ions to make the inside of the neuron MORE negative

- When the inside of the neuron becomes more negative than before, the neuron is less likely to fire/communicate which is called HYPER POLARIZED, membrane is hyper polarized

- EXCITATORY messages: instruct neurons to fire, communicate & send out message. They are going to change the concentration of ions, to make the inside of the neuron less negative. When the inside of the neuron becomes less negative it is more likely to fire, communicate and send out messages

- THEREFORE, the membrane of the neuron would be depolarized

- WHEN WILL THE NEURON FIRE?

- When the electrical charge inside the neuron is about  $-50\text{mv}$  (threshold of excitation)

- Action potential is an all or nothing phenomena- it will either fire or not fire, we don't have a portion of an action potential , tis either happening or its not

- Every single time the neuron fires, it will be the same strength

- Action potential does not travel like an arrow, rather, it seems to travel in a domino-like effect

- Action potential 'hops' / jumps/leap

- COMMUNICATION BETWEEN NEURONS

- Presynaptic neuron decides to send out a message & its gonna fire to produce an action potential, action potential travels ALL the way down he axon until it reaches the terminal buttons

- At the terminal buttons, (inside) there are synaptic vesicles (bags that contain neurotransmitters) and they burst open and release neurotransmitters into the synaptic gap/cleft and then they bind to receptor sites on the post synaptic neurons
  - THEY MUST ATTACH TO RECEPTOR SITES, or the message will not be delivered
  - Neurotransmitters are chemicals that neurons use to transmit messages
  - Receptor sites= structure on the post synaptic neurons that the neurotransmitter attaches to
  - What will happen to the neurotransmitter once its delivered its message? It has to be deactivated
  - How can it be deactivate ? 1) re-uptake - the neuron that released the the neurotransmitter is going to reabsorb it and recycle / use again 2) degradation : an enzyme comes in and degrades the neurotransmitter( break it down)
  - Why do we have this? If the neurotransmitter is not deactivated it will deliver the same message over and over again etc
  - This can overexcite OR over-inhibit the nervous system and neither of these things are good- which is why it has to be deactivated
  - for a healthy nervous system this has to be deactivated
  - NEUROTRANSMITTERS: variety of them in our brain, chemicals that neurons use to deliver messages to other neurons
  - Most neurotransmitters have multiple functions
  - Fundamental to have healthy levels of neurotransmitters, because they are essential for healthy functioning physically and mentally
  - Healthy diet helps this !
  - Dopamine : happiness/ excitement/ pleasure/ THE PLEASURE MOLECULE \* ( if we have healthy levels)
  - If we have unhealthy levels of dopamine- depression, unmotivated, Parkinson's disease could be present when dopamine is destroyed, schizophrenia links with dopamine abnormalities
  - Check out table 2.1 + main text (lists different neurotransmitters \*\*\* definitely check it out and the neurotransmitters they mention around this table) EXAM QUESTIONS

### LECTURE 3

- DRUGS & the brain- synapse is where drugs take their effect & interfere with communication between neurons
  - Drugs produce effects @ synapse at 3 levels
  - Level 1 : presynaptic level (neuron sending out information), level 2: synaptic gap/cleft, drugs can interfere here, level 3: drugs can also interfere with post synaptic neuron activity (receiving information neuron)
  - PRESYNAPTIC NEURON: either increase release of the neurotransmitter OR decrease it, and some drugs even block the release of the neurotransmitter
  - SYNAPTIC CLEFT/GAP: drugs can influence and effect activity here, which is a tiny space between two neurons at the synapse. Interfere with the re-uptake or the

degradation. Enhance the processes, speeding them up, or they could weaken those processes or block them all together

- RECEIVING NEURON/POST SYNAPTIC NEURON: 1 of 3 ways... locks & blocks - some drugs reach the right receptor, they attach to it and block it by occupying the receptor, so because the receptor is blocked the neurotransmitter cannot deliver the message, (coffee works this way). 2 of 3: locks & mimics - drug locks into the binding site at the receptor site, & the drug itself is going to give the neuron a message, it behaves like a neurotransmitter by delivering messages. 3 of 3- drug locks (attaches) but the neurotransmitter can also attach at the same time and enhances / diminish the effects. The neurotransmitter is the one delivering the message still. The drug either makes the message stronger or its going to weaken the message that the neurotransmitter is delivering.

- 2 major types of drugs based on their effects on the brain : agonists & antagonists

- Agonists: enhance the activity of the neurotransmitter, increase.

- Antagonists: decrease the activity of the neurotransmitter, reduce /weaken OR block it.

- MIDTERM ADVICE: EXAM she's going to ask us questions on drugs being agonists and antagonists

NERVOUS SYSTEM :

Central nervous system / Peripheral

Central nervous system: brain & spinal cord

THE BRAIN (CNS): brain is only 2% of the size of your body, but consumes 20-25% of the glucose in the body

- We use glucose for energy, brain relies on it
- Fattest organ in your body = brain @ about 60% fat
- if we made the brain a straight line it would be thousands of miles
- About 80-100 billion neurons in our brains
- 1 neuron can have up to 40 thousand synapses
- Terminal branch/axon -

-TOOLS OF DISCOVERY- how do we study the brain

CLINICAL OBSERVATION: still in use-

- Someone who still has a brain injury/tumour
- Systematic observation of this person & collect data about them and how the damage influences and effects functioning

- Brain manipulation- rational is always the same: interfere and observe

- Surgical, chemical, electrical, magnetic,

- EEG: allows us to see the brain in action, electrodes on the scalp, gets electrical activity of the neurones, analyze brain waves to understand whats happening in the brain - over 100 years been around,

- Neuro-imaging techniques- CT / cat scan

- CT scan does not allow me to see the brain in action/ only takes the x ray but we can see the structure of the brain, if there is a tumour or bleeding

- MRI- does not allow us to see the brain in action

- Magnetic resonance imaging - our tissue will start to emit electrical signals

- PET scan - quite invasive - more active an area of the brain is the more glucose it will consume
- Functional MRI- powerful magnetic field, the machine is tracking blood Flow & oxygen to the brain
- The dog smelled things in a brain and loved the doggie
- When we look at pictures of someone we love our brain pops off and activates - same with dogs smelling human friends
- TOUR OF THE BRAIN : videos on BS
- Cortex : outer layer of the brain
- seed of the mental functioning, reasoning and planning
- 1/3 of the cortex is visible the rest is hiding (why?? To put more brain tissue inside our skulls, by creating grooves and folds,
- Glial cells or glia- we have these in the cortex.
- Glia cells ' nannies/housekeepers ' of the neurons
- Glia cells provide neurons with nutrients, take care of neurons, clean after them
- NOW - glia cells - must be more to them, play an important role in the communication between neurons (constantly talking to each other and to neurons) research suggests they may play an important role in the formation of synapses.
- Some evidence that they play a role in higher mental functioning like learning & memory
- Einstein had an abundance of glial cells
- Glial cells help with intelligence
- Make neural networks more efficient
- Cortex we have 2 hemisphere , left & right
- Left hemisphere controls right side of the body & receives information from the right side
- Right hemisphere controls left side of the body and receives info from the left side
- Corpus callosum - its a bundle of axons , bundle of nerve fibres, they connects the two hemisphere, hemispheres use it to communicate with one and other
- If we took it away the two hemispheres would not be able to communicate with each other
- STUDY THE HANDOUTS C.2.1 AND C.2.2 - make sure to check the figures.
- BRAIN REORGANIZATION : brain plasticity - best discovery, our brain can regenerate , changeable, modifiable, adaptable, flexible, it means that the brain is influenced and affected by everyday experiences
- Our experiences change the brain for better or worse
- Everything we do or do not do changes our brain
- Brain may be able to shift functions & re organize itself after trauma or disease \*\*
- Plasticity also means neurogenesis , formation of new neurons after birth
- Functional asymmetry (laterality)
- Own specific functions in the hemisphere, one is more involved / linked,
- Left hemisphere controls language
- Functional asymmetry does not mean we have a right brain and a left brain

- THERE IS NO RIGHT OR LEFT BRAIN ONLY ONE BRAIN
- Two hemispheres constantly working together to produce complex shit
- Split brain patients - individual who suffered from epilepsy that was interfering with their inability to live productive lives
  - We have a right visual field and a left visual field
  - It does not mean left eye or right eye
  - Information that is sent to the right visual field goes to the left hemisphere
  - Information that is flashed to the left visual field goes to the right hemisphere
  - Normal brain=
  - Split brain you can't send info between hemispheres about vision
  - LH - language, it speaks , rt body
  - RH - left body - its mute it cannot produce language
  - Only the left hemisphere can speak and it does not see an Apple because it goes to the other side .
    - Physical stimulation that we can detect must be transduced / translated into a message that the Brain can understand
- TOUR OF THE BRAIN: LOWER BRAIN
  - 
  - **BRAIN STEM:** the oldest part of the brain
  - The first, to appear - over 500 million years old, still have it today
  - Brain stem starts when're the spinal cord ends, connects to the rest of the brain and its a relay station
    - Brain stem is a cross over point, info coming from right side of the body goes to left side of the brain and vice versa
    - Brain stem is life centre of the brain
    - Contains structure that control vital functions such as breathing
    - Medulla: at base of the brain, sitting on top of the spinal cord, if we were to lose one of our hemispheres, we are likely to survive however an injury to medulla is likely fatal because its linked to variety of functions such as breathing , heartbeat, blood pressure and circulation, controls vital reflexes = coughing sneezing swallowing and vomiting
      - RETICULAR FORMATION: runs the length of the brainstem and beyond, highly complex structure, and is linked to variety of functions = sleep and dreams
        - Damage to this could mean sleep disorders
        - Reticular formation is also linked to control with facial expressions involving emotions
          - Reticular formation is a filter system , linked with arousal degree to which our brains and bodies are energized and excited
          - Linked with attention, helps us focus attention on what we think is important in the moment
            - Reticular formation is wakefulness and consciousness
    - CEREBELLUM: little brain
      - Like the brain stem is over 500 years old
      - It controls voluntary movements, balance, posture, and muscle tone, damage to cerebellum would not be able to walk balance or stand up
        - Cerebellum - motor function that becomes automatic

- 1/10th of the brains volume = cerebellum
- Over 1/2 of the brains neurons are in the cerebellum
- Neurons have 20x more connections and synapses than the rest of the brain
- Learning & memory COMPLEX HIGHER FUNCTIONING = cerebellum
- Reasoning, creativity, language processing,
- Our cerebellum gets drunk too
- 
- THALAMUS: sits in the middle of the brain
- Thalamus is a relay station. All of our senses with the exception of smell all send info to the thalamus, and the thalamus relays this information to higher brain areas
- It also receives info and relays to the right lower brain areas
- Thalamus also filters! Incoming information gets filtered, processed, and integrated
- thalamus may be part of a system that directs attention to potentially significant stimuli
- Thalamus regulates
- Thalamus = goosebump

### **LIMBIC SYSTEM:**

NOT THAT old , its 150-250 million years old

It consists of multiple structures and is linked to multiple functions

#### MEMORY/LEARNING/MOTIVATION

- Amygdala- aggression/ emotions/ memories/ threats
- Hippocampus : plays a major role in memory n learning
- Formation of new memories
- they would have past memories but no new memories if there was damage
- Anterograde amnesia
- Vulnerable to stress
- Chronic stress can kill neurons and shrink the hippocampus
- Spatial info = on average taxi drivers have larger hippocampus
- HYPOTHALAMUS: controls what drives us
- Drive to drink water, to eat, to have sex, essential survival THE BRAIN

#### WITHIN THE BRAIN

- Controls homeostasis, maintenance of internal balance of the body
- Endocrine system is in the hypothalamus
- And it controls the autonomic system
- Pleasure centres are in the hypothalamus
- Some researches believe that people who take drugs because they're pleasure pathways are sluggish so they use drugs or food as a reward deficiency syndrome

**Peripheral nervous system** - consists of all the nerves in the body outside of the CNS

Nerves outside of your brain and spinal cord

It connects the body to the CNS

MAIN JOB: is to Carry information between the body and the central nervous system

2 divisions of the PNS - autonomic and somatic

Somatic NS: motor neuron & sensory neuron

Sensory function: senses collecting info from environment and sending information to CNS , sensory neurons and nerves of the Somatic NS that delivery information to the CNS for further processing and integration

Motor function: motor neurons and nerves delivery order to skeletal muscles to type or write

Autonomic: sympathetic and parasympathetic

Sympathetic energizes and mobilizes. It prepares our bodies for action & to deal with threatening situations and events

Best known as FIGHT OR FLIGHT= sympathetic

Parasympathetic NS- relaxes the body, conserves the bodies resources and energy & helps repair itself

Best known as REST AND DIGEST SYSTEM

They have distinct and different functions however, these two systems constantly work together to maintain EQUILIBRIUM

#### **LECTURE 4:**

Spinal cord , the peripheral NS & the endocrine system

Sensation & perception - chapter 6

Basics of sensation :

musts of sensation: DETECTION/ TRANSMISSION/ TRANSDUCTION - 3 things must happen in order for us to sense 1) detection : must be able to detect the physical stimulation out there ( we have limited thresholds) 2) transduction : the physical stimulation that we can detect, must be transduced / translated into a message that the brain can understand , the brain understands electrochemical messages 3 ) transmission : it must be transmitted to the brain

SENSORY RECEPTORS: highly specialized cells, they are going to detect, transduce , & transmit

Without them we cannot sense

Sensation is a bottom up process

Bottom up means we start from the ground up- we start from scratch, the very basic elements and we build up.

Measuring the senses:

Psychophysics; scientific study on how the external world translates into our experiences of the external world - how we experience the physical world out there

Absolute threshold - even if we have the ability to detect something it has to be strong enough for us to detect it : what is the minimum amount of energy that must be there in order for us to detect it 50% of the time

DIFFERENCE THRESHOLD (JND)- detecting changes in physical stimulation ( getting colder or warmer? ) if we cannot detect changes we could be in trouble, it is essential in survival

= the minimum change in physical stimulation that must take place in order for us to detect it 50% of the time

WEBBERS LAW: \*\* midterm question on Webbers law\*\*

SIGNAL DETECTION THEORY: according to this theory our ability to detect physical stimulation does not depend only on how strong it is.

According to this theory, multiple factors could influence and effect it. ( such as our motivation, emotions, expectations, our beliefs, our health, our assumptions)

SUBLIMINAL PERSUASION: \*\* exam \*\*

SENSORY ADAPTATION : repeated stimulus that is harmless and unchanging our senses tend to adapt, so they will respond less and less to that stimulation

They may. Eventually stop responding  
(Going into a busy loud mall & adjusting )

why is it valuable ? If we cannot tune out all the stimulus our nervous system will crash  
We can only focus on a couple things, we ignore some stimulus to detect other more significant stimulus

CIRCUMVENTING S.A—> instances where nature does not allow our senses to sensory adapt ( ex. Severe pain ) we can adapt to mild pain, but not severe.

Our eyes always make movements so that stationary objects don't disappear from us .

SENSATION = BOTTOM DOWN

PERCEPTION = TOP DOWN

BASICS OF PERCEPTION :

0. Perception definition: when the sensory information reaches the brain, the brain analyzes it , organizes it and is going to interpret it in a meaningful way to the person who is perceiving. TOP DOWN PROCESSING .

0. JEN ANNISTON = FACIAL RECOGNITION - TOP DOWN PROCESSING

0. JUMBLED WORDS- top down processing

Can you have sensation but not have perception : yes .

Prosopagnosia = people can see but they can not perceive faces , they don't know who's face it is they're looking at, but they know its a face. Sometimes they don't recognize their own

can you have perception but no sensation : yes (hallucination, etc)

INFLUENCES ON PERCEPTION:

- Perceptual set : mental predisposition (our influences/culture etc effects)

- Context effects: the context we're in is going to influence & effect how we receive and interpret events & stimuli
- States of being

## SENSE of VISION

- The stimulus : light
- No light= no vision
- Light is a form of electromagnetic radiation
- Light travels in the form of a wave
- Light is part of the electromagnetic spectrum
- Light that we see is visible light = visible to the human eye
- We cannot detect lots of rays on the UV scale
- 400 nm to 700 nm is visible light
- WAVELENGTHS : light travels in wavelengths- 2 physical characteristics that are of interest to us
  - 1 characteristic is the wavelength : distance between the peaks of the waves, physical characteristic that gets translated into the psychological experience of HUE ( colour)
    - Hue does not exist in the physical world- its lightwaves out there and our brain creates the experience of colour
    - Long wl - red light , med wl - green light , short wl - blue light (study in red, blue and green)
    - Amplitude of the wave = height of the wave , this determines the physical characteristic that translates into the psychological experience of brightness
    - HUE = WAVELENGTH , BRIGHTNESS = WAVE HEIGHT
    - Organ = eye
    - In order for us to see there must be light , and the light must reach the retina
    - RETINA (structure) - at the back of the eye, retina is as thick as a piece of paper
      - Innermost layer of the retina : rods & cones connect to bipolar cells and bipolar cells connect to ganglion cells
      - Axons of the ganglion cells, are going to bunch up together to form the optic nerve
        - Optic nerve takes visual information to the brain
        - Blind spot: a bunch of axons leaving the retina so there are no cells that detect light WHERE THE OPTIC NERVE EXITS
          - Fovea : in the centre of the eye
          - Fovea: responsible for our BEST vision / visual acuity
          - Light must reach rods&cones to see
          - Rods & cones, SENSORY receptors in our retina
          - Rods & cones are going to detect the light (ONLY CELLS) and send messages to the brain
            - Photoreceptors
- rods outnumber cones,
  - No rods in the fovea
  -

*Cones are highly concentrated in the fovea. There are fewer cones in the periphery. Cones allow us to see in colour. They allow us to see fine details. Cones look like cones and rods look like rods, hence their respective names.*

- *rods & cones differ in the way they connect to bipolar cells*
- *Cones have a 1 to 1 connection to bipolar cells*
- *multiple rods connect to 1 bipolar cell*
- *They also differ in terms of function*
- *Rods are very sensitive to light*
- *Little bit of light to activate them*
- *We use rods @ night or when lighting is poor*
- *Rods do not allow us to see in colour*
- *Rods = black/ white/ & grey*
- *Rods allow us to pick up peripheral movement*
- *Cones need a lot of light to activate (not very sensitive to light)*
- *We use cones in the daytime & it's because it needs light*
- *Processing of visual information begins at the level of the retina*
- *Ganglion cells begin the processing, ultimately the information is going to reach the visual cortex -Visual cortex: optic nerve takes messages /info to the visual cortex*
- *In the visual cortex we have highly specialized cells called feature detectors*
- *These cells respond to very specific stimuli*
- *Some cells respond to vertical lines, some respond to horizontal lines, angled lines.*
- *Information reaches the parietal & temporal lobes*
- *'Where pathway' parietal lobes*
- *Parietal lobes allow us to see where an object is located in space, and track the movements of an object*
- *Temporal lobes: 'what pathway' - this is how we know what is it that we are looking at*
- *Parallel processing : one way our brain processes information*
- *Serial processing: the Brain is going to process information one single step at a time*
- *We have to finish step one to move to step 2*
- *Step by step by step, no skipping steps*
- *Parallel processing: super fast, means that multiple steps are going to be processed simultaneously*
- *Example: looking at a photo and seeing a bunch of shit at once*
- *This is why we do not have gaps in our vision*
- 

#### **COLOUR VISION:**

*Young-helmholtz theory aka trichromatic theory : red light, green light, blue light- we can create millions of other colours by combining those three, we must have 3 different types of cones*

- *Red cones, green cones, & blue cones*

- While every type of cone can respond to a variety of light colours or light waves, each one is maximally responsive to a specific light colour
  - Red cones = red light
  - Green cones= green light, blue cones= blue light
  - Based on that the brain will determine what colour it sees
  - If all three cones are maximally activated we see white
  - If they are all minimally activated we will see black
  - light hits a colour and the surface will absorb this light and reflects back into our eyes and it activates specific cones , which tells you what colour youre seeing
- Opponent process theory- Hering: acknowledged the value of trichromatic theory, but he felt that it was insufficient on its own to explain all of colour vision
  - Certain visual phenomena / colour phenomena that it cannot explain = for example, complimentary afterimages, if we stare at green and look at white we see red
  - HE proposed we have 4 primary light colours, instead of 3 Red, green, blue & yellow
    - We must have 3 antagonistic colour systems
    - RedGreen system, BlueYellow system , BlackWhite system (the three antagonistic systems)
    - According to hering, the neurons in the red green system are going to respond BOTH the red light and the green light, however, they respond to them in different ways
      - They respond in OPPOSING ways to those lights
      - Basically, if red light excites the neurons of the RG system, then green light is going to inhibit the neurons
      - This pattern is going to inform the brain, if red light neuron is excited its red light if green light neuron is inhibited its a green light ,
      - Whats being excited ? Whats being excited? To what degree & what combination?
        - Based on this , the brain will determine the colour that we will perceive
        - Red light excites neurons in the red green system and green light inhibits the neurons in the red green system
        - when blue light comes in , neurons are excited by blue, inhibited by yellow
        - So red +blue see purple
        - Bottom line (to date) - both theories explain colour vision
        - Trichromatic theory, work at the level of the retina ( we do have 3 types of cones, R G B)
        - Research is also suggesting that we do have cells in our visual system that function in line with the opponent process theory ( ganglion cells seem to function this way, neurons in the brain seem to function in line with opponent process theory)
          - BOTH working
          - ORGANIZATION & INTERPRETATION
          - how will the brain organize and interpret things
          - VIDEOS WILL BE POSTED ON THIS ( make notes)

## LECTURE 5- NOTES

### Hearing - audition

-stimulus : sound waves travel to the brain

- All sounds are psychological experiences our brain created
- 3 characteristics of the sound wave that are of interest to us
- 1: frequency of the sound wave- distance between the peaks of the wave (physical, measured in Hz) humans can detect sound waves of 20-20000 Hertz
- Translated into psychological experience of pitch
- Pitch: how high or how low a sound is - pitch does not mean how loud
- amplitude of the wave- height of the wave , it is measured in decibel Db, which transforms into Loudness
- Complexity of the wave- how many different frequencies does the sound wave have , how many amplitude ?
- complexity transforms into Timbre- what makes a sound unique, what makes your voice unique
- The EAR
- Outer ear
- PINNA - captures the sound waves, funnels them into the auditory canal
- Sound waves travel down the auditory canal until they reach the ear drum , which causes the ear drum to vibrate, these vibrations cause the ossicles to vibrate and the ossicles are the tiniest bones in our bodies
- the vibrations of the ossicles cause the oval window (a membrane in your ear) to start vibrating
- Cochlea (spiral formation in ear)
- Vibrations of the oval window cause the fluid inside the cochlea, cochlear fluid, to form waves (like the waves in the seas)
- Those waves cause the basilar membrane, inside your cochlea to start vibrating also, and the vibrations of the basilar membrane cause the hair cells (cilia) to sway and bend , and this activates them
- Cilia detects, transduce and transmit
- Cilia are the sensory receptors of our sense of hearing
- Then the info goes to the brain via the auditory nerve
- \*\* youtube video in lecture is good for studying regarding ear function \*\*
- DETECTING LOUDNESS
- How do we detect loudness? ... the louder the sound, the higher the number of hair cells that will fire
- Loudness = higher amplitude
- How do we perceive pitch? ... 1) place theory - is about location, location , location! According to place theory, sound waves of different frequencies are going to activate the basilar membrane in different locations - High Frequency activate at the beginning, low frequency activates at the ends of basilar membrane and then this informs the brain ... 2) frequency theory : frequency of the sound wave will influence and effect the rate of firing of the hair cell (cilia) (rate of firing)
- ex. If the incoming sound wave is 350 Hz = 350 action potentials, if the incoming sound waves is 700 Hz, then the hair cells will fire 700 action potentials, so its 1 to 1 correspondence between Hz and action potentials.

- HOWEVER, hair cells can only fire 1000 action potentials a second
- REFINEMENT OF THE THEORY IS THE VOLLEY PRINCIPLE: according to the volley principle, when sound waves are incoming hair cells are going to team up & coordinate their activities. 1 group will fire 1000 action potential, another group will fire another 1000 action potential (depending on the wave frequency) KEY: they will not fire simultaneously, but they will fire in rapid succession one after the other & that informs the brain

-  
BOTTOM LINE (to date) : place theory = best at explaining high frequency sound waves , how we perceive low frequency sound waves = frequency theory is best & anything in between a combination of both works

How to locate sound:

time of arrival : Whatever ear is closer to the source of the sound will receive the sound wave first- then the further ear will receive the sound wave second & that informs the brain

Loudness of sound wave: ear that is closer will perceive the sound as louder (as the sound travels through our bones & body to the second ear - the sound gets muffled )

When a sound hits our ear at the same time we tilt our heads, move , look around

HEARING LOSS:

2 major types: 1 - **sensorineural hearing loss** : damage to structures that are involved in the detection , transduction & transmission and analysis of information

Solution is a cochlear implant

2- **conduction hearing loss** : damage to any structure that carries the sound waves, that transport the sound waves. Solution : digital hearing aid (some compress sound) - they amplify soft sounds and leave loud sounds alone

Take care of your hair cells! Cilia gets damaged -

Other senses

TOUCH : skin is the largest organ in our body, it protects ,

20 square feet, 6 or 7 pounds of skin

Cutaneous receptors - CUTANEOUS SENSES

4 major types of receptors in our skin - pain, itch, pressure and for temperature (warm & cold)

How do we experience so many sensations with only 4 receptors ?? researchers believe that different sensations will stimulate combinations of receptors

Mix & match - we feel heat because of simultaneously activate cold and warm receptors

Touch is crucial to physical n mental well being

PAIN:

Nociceptors are pain receptors

Its essential to survival because it informs us that something is wrong  
Experience of pain is complex - does not depend on the tissue damage- multiple factors influence and effect our experience of pain (psychological / social )

Gate - Control Theory -

- neurological gate in the spinal chord
- when the gate is open we are going to feel pain
- when it is closed we will not feel pain / or we will feel reduced pain
- small nerve fibres open the door when they activate
- the nerve fibres carry pain information
- large nerve fibres activated, the door is closed or somewhat closed
- either we feel no pain, or reduced pain
- large nerve fibres carry information OTHER than pain
- carry touch, pressure, scratch , etc
- stimulation of certain areas of the brain could close the door
- beliefs can help pain (placebo)
- stress can affect pain (fight or flight, we won't feel pain because our body wants to survive)
- emotions can close or open the door

SMELL ( olfaction)

-chemical sense : for us to smell, they must enter our nose and enter our olfactory receptors

-receptors are embedded in the olfactory epithelium

Which is a membrane filled with mucus

- Send info to the olfactory bulb, sends info to different parts of the brain including limbic system and temporal lobes

- Limbic system- emotions & memory
- We can perceive over 1 trillion odours
- 400 different types of receptors
- How?? Can this happen??
- Different odours and smells activate different combinations of these

receptors

- Olfactory cells do regenerate every month or two
- But it doesn't mean the same number will regenerate
- Only cells we know to regenerate
- Ageing is also a factor with olfactory sense
- Strong connection with emotions and memories (due to the limbic system connection, as it is linked with emotions and memories

- Loss of smell could be a marker of Alzheimers ... eek
- Psychopaths have a poor sense of smell! Weird

-

## SENSE OF TASTE VIDEO :

Essential back in the day- bitter would warn us something is bad

Taste is a chemical sense- come into contact with gustatory cells, taste sends info to the brain . Gustatory cells are found inside of taste buds

- taste buds are found inside papillae (the bumps inside your tongue)
  - also have gustatory cells in our cheeks & roof of the mouth and our throats
  - 4 basic taste sensations : sweet sour salty and bitter BUT then Japanese found 5th sensation called umami (linked and associated with savoury foods)
  - Umami is linked with mushrooms & tomatoes, fish
  - Researchers think we have more than 5 taste receptors - we may have 6 , fat???
  - (unknown, speculation)
  - Sensory receptors = gustatory cells , these cells regenerate, every week to ten days, as we age, they slow down regenerate
  - By the time we reach age 20, we will lose 1/2 of our taste receptors
  - Strong connection with sense of taste and sense of smell ,
  - Smell significantly enhances the flavour
  - If our nose is blocked our food tastes bland
  - In our tongues? We may have OLFACTORY CELLS (sense of smell), which would explain the connection between taste and smell
  - Vision also effects our sense of taste
  - If we change food colouring to change food colour , people will have a completely different taste experience
  - Posture / position of our body can influence and effect our experience of food
- 
- Sitting down while eating = made people more critical of the food had stronger connections
  - The cutlery & the colour of the cutlery + plate, the weight of the plate could influence and effect how we end up tasting our foods
  - All of these examples , reflect sensory interaction
  - Sensory interaction means our different senses interact with each-other and do influence and effect each other

## BODY POSITION & MOVEMENT VIDEO

- senses that collect info from our very own bodies
- Kinesthesia - K SENSE - allows us to know where our body parts are , allows us to know their location , what they are doing , their position , moving or not and in what direction are they moving and at what speed
- Found throughout the body
- Proprioceptors - collecting info from the body and sending it to the brain
- What if we lose that ? You may have to look at your body parts to know where they are and what they are doing- but if you cannot see them , no electricity = info in a

video called 'the man who lost his body' -BONUS MIDTERM QUESTION BASED ON THIS VIDEO

- VESTIBULAR SENSE - connect us directly to our own bodies
- Vestibular sense is responsible for balance, equilibrium , responds to changes in motion, position and gravity
- Allows us to know the position of our head and body as a whole
- If we bend forward, the vestibular sense will inform the Brain etc etc
- Sensory receptors for the vestibular sense = hair cells - found inside the inner ear in two structures ... 1) semi circular canals- contain hair cells that are the sensory receptors for the vestibular sense 2) vestibular sacs- contain hair cells, but also contain fluid (both structures)
- When we move our bodies/head, the fluid shifts and changes , and moves, and this causes the hair cells inside to also move and shift and that activates them and they send this info to the brain

IS THERE EXTRASENSORY PERCEPTION? Video

- do we have a 6th sense
- Telepathy: mind to mind communication, direct... no use of any language, verbal or non verbal
- Clairvoyance: being able to see remote events, remote objects... capable of seeing objects and events that are occurring in a location completely different than the one you are currently in
- Precognition: be able to see / know the future
- Psychokinesis : using the mind & the mind only to influence and effect physical objects
- Parapsychology: scientific investigation of esp phenomenon
- To date: we don't have any scientific evidence in support of ESP, nothing valid or reliable
- We need reproducible phenomena in order to prove , has to be able to happen over and over again , otherwise we cannot rule chance or randomness as the explanation

### **ANIMATION EAR VIDEO-**

- wave of pressure through the ear, frequency (speed) effects pitch
- Level of air pressure is directly related to how loud
- Outer part of the ear catches the waves
- Faces forward and has curves to determine everything
- Travel through ear canal to the drum, middle ear transfers this energy to the smallest bones in our body( malleus, incus and stapies) start in motion
- The malleus is attached to the ear drum, stapies is a reversed piston
- Pneumatic amplification = dramatic pressure change
- 22 x greater final pressure of sound rather than when it firsts arrives
- Cochlear is coiled, 3 chambers, fibres resonate and cause hair to move, which then sends info to the brain and we all good

## LECTURE 6 - NOTES

### CHAPTER 3- CONSCIOUSNESS & THE 2 TRACK MIND

- 3 major sections
- What is consciousness? ... being aware of ourselves & our environment
- We don't know how consciousness is created
- DUAL PROCESSING - the brain processing information at 2 levels (conscious/ unconscious)
- Conscious level : serial processing
- Consciousness processes info 1 single step at a time
- Unconscious level: parallels processing (processing multiple steps at the same time)
- Unconscious is MUCH faster than the conscious mind
- You cannot multitask consciously
- **PAGE 92-99 NO QUESTIONS WILL BE ASKED ON THE FINAL OR THE MIDTERM**
- Earn a point: 2ND MIDTERM (page 100-109) at least 5 questions from these pages, maybe up to 10
- 1% of your grade (pages 110-118, then there will be an open quiz on brightspace)
- As many attempts as you want ( until you get the questions right) available until final exam
- DRUGS & CONSCIOUSNESS
- Psychoactive drugs: drugs that are going to influence and effect the functioning of the brain ( any kind of drugs)
- These drugs produce the effects at the level of the synapse
- They interfere in the communication of neurons
- Most street drugs agonize/ enhance dopamine ( the pleasure molecule)
- DOPAMINE:
- Most street drugs activate the reward pathways in our brain
- Enhance = agonize
- addiction: brain disease
- Tolerance: we build it up
- We develop tolerance the more we do a drug
- We have to take more and more of a drug to get the effect we once did
- Neuroadaptation; main reason for tolerance changes
- neuroadaptation is an example of neuroplasticity
- The brain changes with experience & when we use drugs, that is an experience
- Our brains change to adapt and adjust to the drug
- The brain may stop making certain neurotransmitter - may shut down some receptors
- Other organs might adapt to the presence of the drug
- Withdrawal - if we stop using a drug we can go through withdrawal
- Unpleasant physical symptoms & feelings
- We go through withdrawal when we become dependent on the drug (physically & psychological) so we can function 'normally'

- Expectations: our expectations, beliefs, assumptions COULD determine / influence and effect how a drug will effect us
- Because the effects of the drug are not just due to its biochemistry
- Heaven to hell
- Different types of drugs- in this course, stimulants, depressants and hallucinogens
- STIMULANTS: a psychoactive drug that are going to enhance, increase, speed up the activity of the nervous system (ex. Caffeine, amphetamines,
- Meth is particularly terrible-
- STIMULANTS , CONT'D :
- 1) smoking- 1/5 death in the US linked to smoking, 1 billion
- Smoking damages the DNA- nicotine interferes with our bodies ability to fight cancer cells (changes after 1 DART FML )
- 1 cigarette = 12 less minutes of life... women are more affected than men
- Women who smoke lose 16 years of life in comparison to men WTF
- If people stop smoking it increases life expectancy more than any other preventative measure
- Smoking is a paediatric disease because it gets you really young
- Nicotine affects multiple neurotransmitters : including acetylcholine, norepinephrine & dopamine
- Nicotine enhances (agonize) the activity of acetylcholine, norepinephrine and dopamine, and it has a dual effect on the brain
- Nicotine can perk us up if were tired, it could also calm us down if we are hyper
- People use nicotine to regulate their states which makes it harder to quit
- COCAINE: stimulant- highly addictive , rush of euphoria , energy, confidence, pleasure
- How does cocaine produce its effects? AGONIZES (enhance)) multiple neurotransmitters ; norepinephrine, serotonin and dopamine
- Agonizes by blocking the re-uptake
- Cocaine can give us chronic , permanent depression,
- Cocaine- we might experience FORMICATION :feels like bugs are crawling under our skin . We may experience STEREOTYPIC BEHAVIOUR: no sense, no goal and no function and they repeat over and over again , we could experience PSYCHOTIC EPISODES: lose touch with reality, paranoid, we could become violent and aggressive under the influence of cocaine , we could experience convulsions & death
- Cocaine is illegal but used to sell coke willy nilly in pharmacies and coke (pop)
- **ECSTASY (MDMA) :** a stimulant & hallucinogen
- Ecstasy neurotransmitters: enhances dopamine & norepinephrine by blocking their re-uptake , ONE neurotransmitter is particularly effected by ecstasy and that is serotonin, it does two things- increases the release & blocks the re-uptake (significant amount of serotonin at the synapse)
- Short term effects: serotonin depletion, the brain is going to take some time to replenish the supply of serotonin, during that time we are crashing \*depression/ anxiety \*\*,
- Long term effects: damage to serotonin producing neurons, we know this from animal and human research, damage to serotonin producing neurons

- Human studies- 20-60% of damage, higher use, more damage

## LECTURE 7- notes

**Depressants:** notes on separate videos— check them out after

**HALLUCINOGENS:** aka psychedelics , mind-manifesting, mind-expanding

- the most profound effect of all drugs on consciousness
- significant effects on perception, cognition, emotions and behaviours etc
- LSD (synthetic) : developed in 1938 by Albert Hoffman (\* don't need to know this for the exam)
  - developed for medical purposes, forgot about it and kept doing other medical research & then one day he was in the lab and he got stoned accidentally
  - Effects differ and vary , some people get a good trip & some people get a bad trip and we have no idea why
  - Some effects of LSD: physical, emotional, distorted perceptions, distorted sensations (taste sounds, hear colours) , distorted thinking, out of body experience,
  - Lsd mimics serotonin , behaves like serotonin ,
- Marijuana (natural) -
  - earn a point : 1 single page, 2 questions on marijuana page

INFLUENCES ON DRUG USE:

- study only the handout note that DR HADDAD is posting for this section for the exam

## LEARNING - CHAPTER 7

- introduction: learning in psychology is defined as relatively permanent change in how we think, feel and behave as a result of experience
- learning Makes us adaptable n flexible, it gives us hope because we can learn & unlearn things
- 3 major ways that we learn : classical conditioning, operant conditioning and observational learning \* see later , we will discuss later \*
- **CLASSICAL CONDITIONING :**
  - What does conditioning mean? Learning to form associations
  - Classical cond= we learn to associate two events or two stimuli, we learn that one event signals the arrival of another event
  - It allows us to make predictions & it allows us to take preventative actions if necessary
  - Sometimes our classical conditioning processes may be the reason why you feel sad/ anxious at random times
- PAVLOVS EXPERIMENTS
  - Psychic secretions - dog associated arrival with food
  - Dog gets food = dog salivates ( normal , natural , innate, this is a reflex)
  - Food in this case = unconditioned stimulus (US), salivation in reaction to the food= unconditioned response (UR)

- Unconditioned = unlearned, no learning is necessary its a reflex it is natural and innate
- When you see response the word response is another word for behaviour
- Bell in this case is a neutral stimulus (because it does not trigger salivation naturally)
- Bell +food , we repeat it a bunch so because of the food , salivation occurs
- After a while the bell alone triggers salivation THAT is classical conditioning
- So now the bell is a conditioned stimulus (CS), and the salivation as a response to the bell is a Conditioned Response (CR)
- Conditioned = learned
- Higher ordered conditioning : we trained the dog to salivate at the sound of the bell and now he does so.. the bell itself will be used to train the dog to salivate when he sees a red triangle
- Red triangle, then sound the bell (he will salivate because he was trained) , do this a bunch & ultimately the red triangle by itself will now trigger salivation in the dog
- The process is called acquisition : when the dog learns how to salivate due to stimulus
- Some factors influencing learning via classical conditioning : one factor is frequency of the presentation ( the more we repeat the sequence, the better the learning) , another factor is timing, when you sound the bell the dog must get food immediately after / shortly after, otherwise learning may not take place, another factor is the order of the presentation, must sound bell first then give the food if you want the bell to signify food
- example: CS followed by UCS, essential for learning and survival
- Extinction : when you unlearn something with a stimulus and response ( dog stops salivating at the sound of the bell because of extinction)
- Spontaneous recovery: out of the blue an unlearned response pops up
- Generalization : (ex. A dog bites you and now you're afraid of all dogs) - can be adaptive or maladaptive ( generalize in a bad way, hate all men because one hurt you, adaptive because you don't cross the road for any car not just a red one)
- Stimulus discrimination: example- train the dog to salivate at the sound of a very specific bell and the dog will only salivate for that specific bell no salivation for other bells -
- UPDATING PAVLOV'S UNDERSTANDING : much of his ideas stood the test of time
- Cognitive processes: pavlov ignored cognitive processes, modern researchers challenged him on this (rescorla challenged)
- Rescorla said cognitive processes are super important to learn via classical conditioning - they matter because animals are assessing and evaluating information because they do not learn stupid, they wanna know if he info is reliable & giving predictive powers (they will only learn it If the answer is yes) they are Strategic
- Biological constraints: pavlov believed that if you follow the rules of classical conditioning and strictly follow them we should be able to teach anything
- Modern researchers challenged this... you can teach a lot however nature will limit what you can teach
- Pavlov's legacy : classical conditioning & played a significant role in the development of psychology as a science
- Pavlov influence John watson

- introspection: subject is going to watch the workings of his own mind and he reports on it -
- Watson was opposed to the goal & method of psychology and consciousness
- If it cannot be observed objectively, it shouldn't be studied and if it was too subjective it should not be used
- The goal of psychology should be to study observable behaviours (objectively)
- Watson had ideas but did not have the scientific methodology to do it BUT THEN he read the work of Pavlov and now he has the scientific needed to carry out his vision of what psychology should be about
- Watson is a cofounder of behaviourism (study objective behaviour)
- Behaviourism DOMINATED psychology for over 50 years, and during this time little research done on consciousness, motivation, emotion
- Now it does not! But it is still a very important school in psychology
- Midterm tip : definitely understand the examples in the textbook for Pavlov - how it explains a particular concept - examples will be on the midterm

### **ALCOHOL VIDEO**

Depressants definition. : psychoactive drugs that depress, reduce and slow down the activity of the nervous system

Alcohol is a depressant at low, medium & high doses

- Fetal alcohol syndrome : FAS facial characteristics- small eye openings, smooth philtrum, thin upper lip
- Sexuality -
- Organ damage
- Alcohol effects Neurotransmitters : enhances GABA (agonist) reduces GLUTAMATE (antagonist) , DOPAMINE & ENDORPHINS (agonist)
- Alcohol shrinks the brain , particularly frontal lobes & hippocampus

### **BARBITURATES video:**

- depressants
- GABA agonists (enhance eh activity) - GABA inhibits activities of neurons
- Low doses - barbiturates are relaxing, calming
- Larger dose- impair,
- High- coma / death
- When combined with other depressants (ex alcohol) they can have lethal additive effects
- Health ledger : od on prescription meds

### **OPIATES video:**

- aka narcotics - can be both nature made & man made
- Opium, heroin, morphine, oxycontin,
- Heaven & hell
- Feelings of euphoria, contentment, reduced pain
- How do opiates produce their effects? Mimicking endorphins : endorphins are natural pain killers produced by our brains, feel good chemicals in our brains

- Opiates themselves deliver message to the neuron
- ENHANCE (AGONIZE) DOPAMINE
- Brain stops making its own endorphins & if people overdose they can die. But also combination makes a lethal additive effect
- glee: Cory Monteith OD'ed on alcohol & heroin

## LECTURE 8 notes

### LEARNING

#### OPERANT CONDITIONING:

- skinner's experiments
- skinner is the name linked and associated with operant conditioning
- Skinner = behaviourist until the end
- Respondent behaviour ( responding to a stimulus / reacting/ being triggered)
- Operant conditioning : major way we learn : we associate a behaviour with its consequence/consequences
- Everything we do has a consequence , we learn that association ( ex. Too many sweets= weight gain)
- We are initiating which is why it is called operant because we are operating on the environment
- Operant behaviour
- A fundamental / essential principle of operant conditioning is : behaviour is controlled by its consequences
- Behaviour produces consequence , but when it produces a desirable consequence we are more likely to repeat it (reinforcer = desirable consequence)
- 2 major types of reinforcers : positive & negative
- Both reinforcers increase the probability that the behaviour will occur again in the future
- Positive reinforcers: we will receive / obtain/ get something desirable ..something we want, something pleasant ... something pleasant is going to be added ( think of it like addition)
- Negative reinforcer: behaviour leads to the removal of something unpleasant/ do not want, and because of this were more likely to repeat the behaviour in the future
- Taking a shower and getting rid of BO is negative reinforcer because taking a shower got rid of the smell that we do not want
- Primary reinforcers: reinforcers that basic needs & they are naturally rewarding / satisfying/ reinforcing - no learning is required example : thirsty & drink water
- Eating & drinking are primary reinforcers
- Conditioned reinforcers - aka secondary reinforcers : money is a classic example
- Would a baby care? If they don't its secondary , if they do its primary
- Immediate reinforcers: immediate or shortly after we get reinforced for the behaviour (smile )
- Delayed reinforcers: do a behaviour but we have to wait for a while before we get reinforced for it (example, studying for an exam and then waiting for your grade)

## **Schedules of reinforcement**

- how often are we going to reinforce behaviours
- two major types of schedules of reinforcement
- 1- continuous reinforcement 2- intermittent or partial reinforcement
- 

Continuous reinforcement : every single time the desired behaviour occurs, we will reinforce it

-fantastic to teach a new or difficult behaviour however if you want to maintain that behaviour its a good idea once it is well learned to switch to intermittent or partial schedule reinforcement

- we need to switch because once you stop reinforcing continuously the behaviour does not last for very long after that
- With continuous reinforcement behaviour is not resistant to extinction
- 

### **INTERMITTENT REINFORCEMENT:**

-sometimes the behaviour is reinforced and sometime it is not

- hence why its called partial
- Makes the behaviour more existent to extinction
- Start with continuous and then switch to intermittent
- 2 major types of intermittent schedules : ratio schedule & interval schedule
- Ratio means the schedule is response based, the number of responses (response means behaviour) , that will determine when the behaviour is going to be reinforced
- Interval schedule means it is the passage of time that will determine when the behaviour is going to be enforced
- Ratio : two types of ratio schedules : fixed & variable
- Fixed ratio scheduled: very specific number of behaviours must occur in order for the behaviour to be reinforced (example: have to produce 5 sweaters to get paid 200 dollars, you must complete all 5 to get paid, only 5)
- Variable ratio schedule: the number of responses that must occur for the behaviour to be reinforced is UNPREDICTABLE (example: slot machine win, as long as you pump money into the machine at some point something will happen, you don't know when)
- No idea when we will be reinforced we just know we have to do the behaviour
- INTERVAL - time based reinforcement (passage of time) 2 types , fixed & variable
- Fixed interval : a very specific amount of time must go by before the behaviour is reinforced ( ex. Every 10 mins we check the rat if he's pressing the lever at 10 mins he will get reinforced, must be at 10 min intervals)
- Variable interval: amount of time that must go by before the behaviour is reinforced is unpredictable

## **PUNISHMENT - still in operant conditioning**

- a behaviour produces a consequence that is undesirable, aversive/ unpleasant and because of this we are less likely to repeat this behaviour in the future
- Punishment makes behaviour less likely to repeat

- 2 major types of punishment , positive & negative
- Both types are likely to decrease the probability that the behaviour will occur again
- **POSITIVE PUNISHMENT: \*think addition & subtraction \***
- **POSITIVE:** we do a behaviour and as a result we are going to receive/obtain/get something aversive/unpleasant as a result. (ex - spanking)
- **NEGATIVE PUNISHMENT-** we do a behaviour and as a result something we like, something that is pleasant is removed/ taken away ( ex. Take away laptop privileges , take away gaming console, getting grounded) as a result, less likely to give that behaviour in the future
- sometimes parents inflict punishments that are harsh, unpredictable, unpleasant/ aggressive/ violent = serious negative side effects including suppression , aggression, fear/avoidance, helplessness , does not guide one towards more desirable behaviour

### **SHAPING BEHAVIOURS**

- reinforcing successively closer approximation of a behaviour until the correct behaviour is displayed
- (example, training a dog to surf... bring the surfboard home to get the dog used to it & give a treat every time they are close to the board, and keep doing it so they think the board is good, etc etc)

### **UPDATING SKINNER**

- cognition & operant conditioning : skinner believed we don't need cognitive processes to understand - he was a serial behaviourist
- Latent learning challenges skinner
- Learning according to skinner happens via trial and error/ rewards & punishment
- Behaviour is effected by consequences
- Latent learning challenges this notion : latent learning basically is the learning that takes place without rewards (learning that still happens)
- We learn a lot throughout the day, it is the kind of learning that is not evident until we have the opportunity to show it
- Cognitive map also challenges skinner
- Skinner pushed aside anything cognitive
- What is a cognitive map? Basically its a mental map of a space/layout , map in our mind, once we have cognitive maps we can navigate our space efficiently and make choices (if someone blocks the street to get home, you can go another way)
- Intrinsic motivation - another challenge to skinner
- Skinner believed we do what we do based on rewards from the external environment
- This is somewhat right, because we always want a reward
- Sometimes we do things not for an external reward but because we are interested/ passionate about something
- Intrinsic motivation is when we do something based on our motivation and what we are excited about, no external rewards

- Extrinsic motivation - we do something to get something else ( exercise to look good, versus someone who does it because they love to exercise)
  - Another challenge to skinner's thinking is INSIGHT LEARNING
  - Skinner says trial error/ reward punishment learning
  - Insight learning is an aha moment - lightbulb switches in your own mind, you figured it out without trial /error and without punishment /reward
  - BIOLOGICAL PREDISPOSITION :
- Skinner believed that as long as you follow operant conditioning rules strictly you can condition anything BUT this doesn't work
- we can condition a lot, but not everything
  - Nature will limit us
  - \*\*check text book \*\*
  - SKINNER'S LEGACY : priceless
  - We are shaped by operant conditioning
  - Application of operant conditioning \*MIDTERM TIP- examples of applications , same examples or similar ones on the exam \*\* understand it- do not memorize it
  - Train the monkeys and then they live with people with spinal cord injuries
  - The monkeys become the hands, the arms , the legs, literally ...
  - Super smart monkeys !

## **OBSERVATIONAL LEARNING aka social learning**

- BANDURA- the name associated with this learning
- Observe the social environment around us, we notice what is being rewarded/ punished... & we adapt and adjust our behaviours accordingly
- We observe people that we consider to be 'role models' & we imitate their behaviours (we do what they are doing)
- We seem to be Biologically predisposed to learn by observation/ imitate / model
- Evidence : babies/puppies use this
- evidence: mirror neuron's ... highly specialized neuron's that activate when we do an activity and they activate people watching, researchers believe they are linked with learning, empathy & compassion etc (found all over the brain, including the motor cortex)
- Advantages & disadvantages of learning by observations: we can model good and bad behaviours
- 
- Violence & aggression in the media : does media influence real life?
- Linked and associated with an increased risk for violence in real life (SCIENCE SAYS)
- 3 MAJOR ways how violence is linked? 1) imitation 2) linked to an increase in aggressive emotion & thoughts 3 ) Desensitization to violence in real life

INSIGHT LEARNING VIDEO: chimpanzee puts water in a tube to lift the peanut , intuitively knows

## LECTURE 9 NOTES

### Chapter 11- motivation

#### MOTIVATIONAL CONCEPTS

-any desire, need, interest, any factor that is going to energize our behaviours / direct & sustain our behaviours

- why do we do what we do? = motivation

#### **Instincts theories:**

- we do what we do because of instincts
- Unlearned behaviours
- Fixed behaviours
- Every member of a particular species is going to engage in that behaviour in the same way (example; bears hibernate , birds migrate)
- Value to instinct theory: no doubt about it there is a genetic component in behaviours, but these theories fell out of favour for 2 reasons (1- they become over bloated, (almost explained every single behaviour)
  
- drive theories: we have basic biological needs , these needs must be met, when they are not met it creates a state of tension (uncomfortable/ aversive) so we are motivated to get rid of the state of tension and then we are back in a state of homeostasis

Incentive theories: we will have biological needs but there are also stimuli in the environment that we are interested in acquiring ( they are attractive to us, we want to obtain)

-ex . Getting a uni degree, getting a good paying job

Arousal theories: we are looking for an optimal level of arousal ( if it is too high it is uncomfortable)

Arousal = energized ( not always sexual)

#### **Maslow's Theory ( Hierarchy of Motives(needs)**

- we have both biological and psychological needs
- They do motivate and drive our behaviours
- There is a hierarchy of these needs according to maslow
- So certain needs must be met first before we can proceed to the next level in the hierarchy and then we can go to the next level
- 1st - physiological needs (need for food, water, etc)
- 2nd - safety needs
- 3rd - love needs ( need for healthy and strong emotional bonds, to love them and to be loved)
- 4th - self esteem needs (important, we matter etc)
- 5th - self -actualization needs ( developing our own unique human potential, blossoming into who we are)

- 6th - self-transcendence needs (we step outside of ourselves and reach out to others or to the planet )

### **-biological needs**

- hunger ( we can just study from the notes : no need to go to the book - for the exam)

### **-SEXUAL MOTIVATION:**

Sexual orientation : study notes and from the book

- study sexual motivation section from the chapter summary/ review in appendix C (we don't need to go to the main text for the exam but you can)

Sexual orientation:

- we are basing this on science and research to date
- definition: who are we attracted to ? Physically, sexually, emotionally
- Heterosexual : like the opposite sex
- homosexual: same sex love
- Bi sexual : we are attracted to both
- Asexual : not attracted to any of the sexes
- Prevalence of homosexuality : different surveys give different percentage : our book 3-4% of men, 2% ish of women
- Erotic plasticity : degree to which sexuality is influenced and effected by factors such as culture, religion & education - also the degree to which sexual orientation is rigid & fixed
- Higher the erotic plasticity , the more sexuality is effect and the less rigid and less fixed the orientation is
- Some researchers have suggested based on research, women have a higher erotic plasticity than men
- Sexuality of men is more influenced by culture, religion, education ,etc
- Factors linked and associated with HOMOsexuality
- Environmental cases? : mother? Controlling mother = gay?? No - research suggests no relationship between a strong mother and being gay. If your father is not around = not effect on being gay
- If you hate the opposite sex? NOPE- doesn't make you gay
- Hormones currently in the blood? Any differences in hormones? NOPE
- Sexual abuse? Does that make us gay ? NO
- modelling? If we have gay parents does this make us gay? NO
- By default ? If we don't have members of the opposite sex around us ? Prison ? Would that make us gay? NO
- BIOLOGICAL FACTORS LINKED & ASSOCIATED WITH HOMOSEXUALITY
- Genes : identical twins are more similar in their sexual orientation than their fraternal twins
- Whenever are identical twins are more similar on something, thats a clear suggestion that there is a genetic component
- Fruit flies: show genetic link
- X chromosome - link for homosexuality

- Hormones currently in the blood - prenatal hormones some research suggests, exposure to abnormal levels of hormones in the womb
- Fraternal birth order: higher the number of biological OLDER brothers a man has, the higher probability that he will be gay
- brain: is there a link between brain and sexual Orientation?
- First study that looked at the brain indicated that the part of the hypothalamus that is linked with sexuality and sexual behaviour is LARGER in straight men than in gay men
- We couldn't determine if it was born that way or behaviourally shaped because we saw the Brain after death
- CEREBRUM ASYMMETRY: recent research suggested that in the brains of straight men and gay women there is cerebrum asymmetry
- This means that the right hemisphere is slightly larger than the left hemisphere
- What about straight women & gay men? Research suggests the two hemispheres are roughly the same size
- Happens in the womb or shortly after birth therefore its birth and not behaviours linked to this
- Connections of the amygdala connections are more similar to each other in straight men and gay women
- And they are different than the connections found in the brains of straight women and gay men
- Animal kingdom there are homosexual behaviours
- The more homosexuality the more peaceful the species
- Sexual prejudice - when we have a negative attitude, dislike, hate , hurt only because of sexual orientation
- Ostracized = part of our brain activated that causes pain just like physical pain
- Leads to suicide (ant. Cingulate c part of the brain)
- Achievement motivation : we need to compete and master challenges
- grit= we stick with things no matter what it takes (sometimes better than IQ)
- Will smith has grit

## **LECTURE 10**

### **EMOTIONS**

- 6 major sections
- Intro: what are emotions ? Complex psychological processes
- 3 components of emotions : physiological arousal/response (ex. heart beating when scared) , behavioural expression (ex. Slamming the door when youre angry), subjective or conscious experience (ex. Being aware of what youre feeling/ whats going on- I feel sad, etc)
- Emotions are adaptive, they can be highly adaptive
- Some are essential for survival
- Emotions can also be maladaptive : when our emotions are overwhelming / over exaggerated/ overtake us, and interfere with our ability to function effectively
- valence: the degree to which an emotion is pleasant or unpleasant
- Arousal: degree to which our bodies are aroused
- Emotion diversity : when we experience a wide range of different emotions & we experience a balance of different emotions, research suggests that having

emodiversity both negative and positive is linked with better health physical and mentally

- Rational decisions = emotion/logic (primitive processes)
- Being capable of feeling emotions is linked with rational decision making
- THEORIES OF EMOTIONS
- The James - Lange theory : completely opposite to common sense
- Common sense: example : according to common sense we see a snake so we feel scared, so we run away and our heart beats fast ...
- **James-lange theory:** snake, —> runaway, then feel scared ...
- **Canon bard theory :** snake —> feel scared, run away & heart beats fast happens all at once and independently of each other
- **Shacter's theory** (aka two factor theory of emotions) : 2 factors must be present in order for us to feel an emotion ... 1) physiological arousal is a must 2) cognitive label that we put on the physiological arousal ( you decide what emotion you are feeling... happy or sad) BUT problem - according to him. Physiological arousal is similar across many emotions - so the context were in will help determine the label
- **Spill over effect:** 2 situations (a &b) situation a comes first, b second, according to shacter, the physiological arousal from situation a is going to spill over into situation b, transfer / spill over into situation b... when it spills over it is going to enhance / magnify / increase the emotional experience created by situation b
- Make up sex after a fight is supposedly more fun/ exciting - this is due to spillover effect!!
- Do we think first, feel second or the opposite?
- We have different perspectives
- **Cognitive therapy :** a form of psychological therapy that is effective for a number of different disorders, including depression and anxiety
- The basic premise is that if youre depressed/anxious for example: it is because of the way you think , your irrational beliefs, assumptions, unreasonable expectations & according to Cognitive therapy if you want to step out of reduce then you have to examine the way you think/ beliefs / assumptions . You must challenge them using logical, critical , rational thinking
- **ZAJONCE:** agrees our thoughts can influence our emotions HOWEVER, there are also instances where we feel first, our emotions are so quick and powerful we dont have time to think , then the thinking brain thinks second
- **Le doux :** based on research he proposed a model that states info linked and associated with emotions could travel along 2 roads to the brain
- The roads are the high road and the low road
- High road: sensory information (except for smell) is going to the thalamus , then it sends info to the cortex including the prefrontal cortex, and when the info reaches the prefrontal cortex it will take time to analyze it and then makes a decision and sends the decision to the amygdala, and based on the info from the prefrontal cortex it produces the appropriate emotion
- Low road: thalamus —> sends info directly to the amygdala ( bypass the prefrontal cortex) and the amygdala assesses and interprets to trigger the appropriate response

- The low road is very fast, much faster than the high road and its unconscious
- The high road is slower, and while parts may be unconscious but the prefrontal cortex is conscious
- LE DOUX: sometimes, particularly when the stimulus could be potentially threatening the info can travel both roads simultaneously but we will get the low road reaction first but info is still travelling to the high road so it will assess
- **LAZARUS** : even in situations where we are feeling first and thinking second, the brain must have unconsciously appraised and evaluated the situation otherwise we would not be feeling emotions
- So just because its unconscious it doesn't mean its not taking place
- All these pieces are important in understanding emotions
- **EMBODIED EMOTIONS**
- We feel our emotions in our bodies
- The ANS autonomic nervous system : plays a role in our emotions
- Physiology of specific emotions : to date some emotions there are similarities but also differences
- Angry body temp goes up, fear = body temperature goes down but both our hearts beat fast
- Positive emotions linked with activity in the left frontal lobe
- Negative emotions linked with high activity in the right frontal lobe
- Need to study notes and book for the emotion chapter

## LECTURE 11 - MEMORY

- **notes from handout & then lecture**
- Retrieval : getting the information out of storage/ long term memory (ex. Opening a file on your computer)
- Retrieval cues: anything that is going to help/enhance and facilitate the retrieval process / remember better
- **priming**: when we are exposed to a stimulus this stimulus will automatically and unconsciously activate in our memory any associated that is linked and associated with that stimulus
- we remember the first and last part of something most and the middle part the least
- The serial position effect: two parts- the primacy effect and recency effect :
- Encoding specificity principle: if we can recreate the original conditions that we were in when we learned the information, this will make it easier to enhance retrieval and we will remember things better
- Context effect: if we try to remember something we happen to be in the same or similar context to the one that we were in when we encoded the information its likely to enhance retrieval so we will remember better (if we study in our rooms, do the exam in our room)
- Moods & memories : state dependent memory \* if we are in the same mood we were in when we learned that, retrieval will be easier
- Moods & memories; mood congruent memories - the mood we are in right now can influence and effect the moods we retrieve, so if were happy and someone asks about our partner or friend we are likely to retrieve happy memories of them

- State dependent mood
- Forgetting: normal and natural of every day life
- Natural : infantile amnesia —> hard to remember our first 3 1/2 years and if we do they are unreliable.
- Why do we suffer from this? Main reason: memory system \*hippocampus\* is immature
- Medical reason for forgetting: trauma, disease
- Alzheimer's disease: kills and destroys neurons in the brain , acetylcholine producing neurons (linked with memory and learning)
- First signs of Alzheimers are memory problems: forgetting
- Amnesia : severe loss of memory either because of illness, surgery , trauma etc
- Retrograde amnesia: we tend to have difficulties remember some or most of our past information (backward acting)
- Anterograde amnesia: difficulty forming new memories : effects explicit memory more than implicit memory — forward acting because we have difficulty forming new information
- Normal and natural forgetting - how fast do we forget? What we forget we forget quickly, fast and very early on, and whatever we retain we retain for a long time
- Forgetting curve is shaped like a letter. L
- Forgetting is determined by how long ago we learned it
- Why do we forget??normal & naturally : 5 key theories : motivated forgetting/ decay theory/ retrieval failure / interference : retro in, pro in/ encoding failure
- Motivated forgetting: we forget because we want to, we don't want to remember , 2 ways of doing so 1- suppression (consciously make the decision that I will not think about this or give this any more time, shut it down and move on) 2- repression ( unconsciously push the memories deep into the unconscious and leave them there)
- According to the theory ,these memories will still influence and effect us causing anxiety and depression
- Repression is highly debated - some believe therapy is the way to access the unconscious and retrieve those memories to examine them, deal with them and move on
- Memory researchers have doubts on repression - research indicates that the problem is not repressing the memory its that when memories are traumatizing and horrifying we cannot seem to forget them, they seem to intrude, they seem to be ongoing
- We could have psychological disorders like PTSD
- Debate is ongoing
- **Decay theory:** when we don't use it or think about it in our memories , the synapses linked and associated with those memories are going to weaken and decay so we forget
- **Retrieval failure:** we forget because we are unable to get the memory out of storage ( you know the word but you cannot get it out- on the tip of your tongue)
- **Interference :** difficulty of remembering because pieces of info in our memory will compete with each other, they will intrude on one and other & interfere with our ability to remember - two kinds of interference : retroactive interfering (backward acting- new information we have learned is going to interfere with our ability to

remember old information) and proactive interference : forward acting ( the old information we have learned is going to interfere with our ability to remember the new information we have learned)

- **Encoding failure:** we forget because we have not learned/ encoded the information in the first place (distracted during a lecture due to texting so no encoding)
- **MEMORY CONSTRUCTION**
- Human memory is not like a movie that replays over and is the same
- Our memories are like play doh , some info is added and removed , it changes, some info is exaggerated & all of this happens unconsciously
- Multiple factors influence and effect our memories : past knowledge, past experiences, new info, our beliefs, experience, schema etc etc
- Misinformation effect: if after the event we are given false info after the event, this information could be encoding and blended with our memories of the actual event which can change our memory of the actual event
- Example - car accident study /// question phrased with three different words contacted, hit and smashed, and even though they all viewed the same video the word that was used changed their memories of what they watched . Smashed went the fastest .. stronger word = faster the cars were perceived to be going
- This information is unsettling
- Imagination effect : we can imagine something so strong we believe it to be true
- Bottom line our memories are constructed and does not function like a video camera
- Source amnesia: this is when we either cannot remember when we got out information or when we misattribute the source of our information
- **DISCERNING TRUE AND FALSE MEMORIES**
- Research suggests that it is extremely difficult to tell the difference between real and false memories because both types can be very persistent , vivid and linked with the appropriate emotions
- We tend to be equally as confident in our real and false memories
- Elizabeth Loftus : one of the best known memory researchers and pioneer in memory construction
- Children's eye witness recall : human memory is malleable, flexible, modifiable, so children memory can be easily changed and modified
- How you ask a question or probe could implant false memories.
- Henry molaison - lost his memory after removing parts of his brain for seizure , his explicit memory was altered and he dies at 82 but we got lots of research from him n his Brain
- 

## **LECTURE 12 NOTES**

Study notes, lecture notes, chapter summaries and chapter for the Prologue

- prologue: brief overview of the history of psychology
- psych is a young science (approx 141 years old)
- early greeks- plato and Aristotle wrote extensively on sleep, dreams, emotions, motivation, consciousness, perception, learning, etc
- Nature vs nurture - what makes us who we are
- Plato considered we are born with innate knowledge and ideas (favoured nature part)

- Aristotle believed we come to the world as a blank slate and our experiences shape us (favoured the nurture part )
- Today most psychologists believe we are a result of both and the interaction between nature and nurture shape who we are
- Early greeks to end of 1800 psychology was part of philosophy
- 1879 everything changed: this is when Wundt established the first psychology lab
- W.Wundt worked hard to separate psychology
- Strong believed psychology can be a science in its own right by following the hypothesis scientific method
- WUNDT had over 17 thousand students in his career
- Played important role in psychology
- Titchener was his student and founded the school of structuralism ( no longer today) was studying the basic of consciousness and the mind and the method used was introspection
- Functionalism another school founded by William James (father of American psychology ) he favoured study of consciousness but disagreed with Titchener and his goals. James believed consciousness is constantly changing so its impossible to identify . He focused on the function of consciousness (why does it exist? How does it help ? )He also asked this about emotions. William James was heavily influenced by darwin, evolution and natural selection
- Consciousness and the mind was main focus until early 1900s when things changed again
- Two forces emerged in early 1900s - psychoanalysis and behaviourism
- Psychoanalysis : founded by freud , he believed who we are as people is completely shaped by childhood experiences ( our thoughts , emotions and behaviour is controlled by unconscious mind) freud also believed that the roots of psychological disorders and mental illness are unresolved childhood issues that were repressed and unconscious but still effect us
- Purpose of psychoanalysis is to access these and examine them so a patient can move on with their lives
- Behaviourism : completely opposed to study of consciousness, introspection and the study of the unconscious mind. The main goal is to study what can be objectively observed, observable behaviours
- Three names to know and remember: Pavlov, Watson and skinner ( behaviourism)
- **1950/60s** rebellion took place in psychology
- HUMANISTS: dissatisfied , they believe humans are not puppets controlled and directed by environment and unconscious processes. Humans are capable of free will free choice and self determination, humans are able to consciously direct their lives based on likes and needs, human beings are innately good and born with the motivation to develop unique human potential.
- Humanists : major names carl rogers, and Abraham Maslow
- Cognitive psychology : psychology cannot be whole unless it studies consciousness and mental processes , revived, perception/reasoning/ intelligence/ learning etc are huge within psychology
- MRI fMRI and other brain technologies have facilitated cognitive psychology and neuroscience

