PSYCHOLOGY 101: INTRODUCTION TO COGNITIVE AND BEHAVRIOURAL PSYCHOLOGY

Lecture 2: A brief history of psychology

Biological and Cognitive Psychology:

- Private experience (memory, emotions, imagination) are products of physical laws
- As a science, it must be based on the ass. that behaviour is strictly subject to physical laws
- 'psyche' = (soul) + 'ology' = (study of)
- Psychology: scientific study of behaviour, the mind and the brain
- Cognitive psych: study of cognitive (mental) processes
- Biological psych: study of biology that gives rise to cognition and behaviour

HISTORY

Descartes (1596-1650)

- Rationalism: finding truth through reason
- Reflexes: spinal cord (no need for brain or mind); response to stimuli, brain can control them
- Dualism: brain gives rise to the mind but the mind is not a part of the world (follows diff. laws)
- Believed in free will, suggested causal link b/w mind & physical housing
- Role of pineal gland: action = body moves gland to cause fluid to flow through certain nerves, interaction point b/w mind and body (only non-bilateral thing in the brain)
- Assumed that the world was purely mechanical: challenged the church

John Locke (1632-1704)

- Empiricism: rigorous pursuit of knowledge through observation and experience
- "Tabula rosa": born as blank slates; accumulate experience and knowledge
- What about instincts, language acquisition and reflexes?

Thomas Hobbes (1588-1679)

- Materialism: reality can only be known through understanding of physical world (mind is a machine)
- Brain gives rise (is the material of) the mind, rejected the 'mind'; a non quantifiable variable (reason)

Pierre Flourens (1774-1867)

- Experimental ablation of animal parenchyma (brain)
- Damaged rat brains; demonstrated that division of the brain= diff functions

Franz Josef Gall (1758-1828)

- Phrenology: measurement of the human skull (shape, weight, size)
- Skull growth tracking; personality theory
- Localization of cognitive faculties to diff parts

Paul Broca (1824-1880)

- Patient Tan: 'tan' was the only word he could say despite being able to understand normally
- Lesion in frontal lobe; localization of sp production

Gustav Fritsch, Eduard Hitzig, Wilder Penfield (1891-1976)

- Electric brain stimulation: mapped the brain, motor, memory, tough
- Discovery of motor and sensory maps
- Temporal lobe stimulation and memory

Johannes Muller (1802-1858)

- Doctrine of specific nerve energies; neurons about diff things work the same but can be distinguished

PSYCHOLOGY 101: INTRODUCTION TO COGNITIVE AND BEHAVRIOURAL PSYCHOLOGY

- Same/all electric current/impulse but diff channels (optic vs auditory nerves)
- If the brain can recog diff nature of sensory input, then brain may also be specialized

Herman von Helmholtz (1821-1894)

- Speed of neural activity (27m/s)
- Slower than electricity b/c of synapse (which is chemical, not electrical)

Santiago Ramon y Cajal (1852-1934)

- Golgi stain
- Nervous system is made up of many individual cells

William Wundt (1832-1920)

- First psych lab in Leipzig in 1879
- Structuralism: breaking down mental processes to the most basic components (reduction)
- Introspection: study components of consciousness: ideas and sensation, look inside yourself to describe memories, perceptions and cognitive processes

William James (1842-1910)

- Functionalism: cognitive abilities: what do they do, why is it useful and how are they adaptive
- First complete volume in psychology

G. Stanley hall (1844-1924)

- First US psych lab at john Hopkins (1881)

SCHOOLS OF THOUGHT

Gestalt

- Perception based theory; cognitive processes should be understood by studying their organization, not their elements (holistic perception)
- Muller-lyer line and ground/foreground illusions reveal this

Freudian

- The unconscious: origin of psychological illnesses
- Not aware of everything but it guides our behaviour, no real biological aspect

Behaviourism (Skinner, Watson)

- 'Black box': rejected the mind, tabula rosa
- Study of relation b/w ppl's enviro and their beha w/out hypothetical events occurring in their heads
- Stimulus-response associations: Little Albert: reinforcement learning, fears are learned
- Supports conditioning (pavlov's dogs) and learned behaviours

Cognitive

- Sir Frederic Bartlett: False memories
- Jean Piaget: Kid's errors: there is an age where these roadblocks are passed, insight to the mind: all kids make the same mistakes no matter their nationality
- Kurt Lewin: Subjective experience
- Noam Chomsky: language production: consistency in ability to learn despite conditions
- Geroge Miller: limited mental resources

Cognitive neuropsychology

- Paul Broca; patient Tan

PSYCHOLOGY 101: INTRODUCTION TO COGNITIVE AND BEHAVRIOURAL PSYCHOLOGY

- Phineas Gage: damage to orbital frontal cortex = change in personality (front lobe personality)
- Alexander Luria: founder of neuropsychology; studied patients w/ brain injuries from battlefield
- Patient HM: anterograde amnesia; inability to create new memories

Brain plasticity and recovery of function

- Phantom limb syndrome: feeling sensations in your now non-existent limbs
- Reorganization of the brain: using parts take over other parts of the brain (touch face but you'll your hand)

Cognitive neuroscience

- Michael Gazzangia: founder of neuroscience
- PET scanner: neurochemicals to tag chemicals in the brain in order to track blood flow and neural activity
- MRI scanner: for structure and later for function

Lecture 3: Scientific method and research design

- Research approach in psychology: study a subset of people (sample) to make statements about all similalr indies of interest (population), only sample b/c its cheaper, easier and more practical

THE SCIENTIFIC METHOD

Identify a problem

- Most research builds: was this study flawed? Confirm a finding? Address limitations in previous work?
- Some work is completely novel

Form a hypothesis

- Developing a theory: can change, they are falsifiable (can be right or wrong)
- Forming a hypothesis: 'If, Then ' statement, specific and quantifiable/measureable

Designing a study

- Naturalistic observation: no intervention, no control (pure observation)
- Case study: extensive in-depth study of a specific case; results in generalization
- Survey: large standardized sample (stats/data/anonymous), but contain little insight, may not be completed honestly, restrictions in range of questions, incomplete, self-selections
- Correlation study: false correlations are common, do not imply caustic rela., no manipulation—just relating
- Experiment…

Experiments (key elements)

- Any changes should/will be manipulated on purpose (control)
- Variables: subject, independent and dependent
- Confound v: varies along w/ independent variable thus rendering the experiment internally invalid (time)
- Validity (every bullseye) and reliability (always right)
- Ecological validity: ecological validity: is it comparable to real life situations/nature

Choosing participants and gathering data

- Sampling from a population: participant selection and assignment, control from imp subject variables
- Expectation and bias:
    - Hawthorne effect: subjects alter or improve behaviour in response to being studied
    - Demand characteristics: cue that makes participants aware of what the experimenter expects/wants
    - Blind experiments: participants don't know what they are studying

    - Double blind: experiment conductor and the participant don't know what they are studying
- Attrition: leaving/dropping out of studies

Analysing data
- Statistical analysis, revisiting and evaluating your hypothesis
- Things to consider: replicable? Does it generalize?, limitations and future directions
- Sharing findings: journals, annual conferences, colleagues

TOOLS

Literature review
- Review articles, empirical studies
- Thinking outside the box

Search engines
- PsychINFO, Pubmed.org, google scholar

For measurement
- Computers: precise calcs, constructing and testing models (simulation)
- Biomedical technology: single cell recording, electroencephalography (detects electrical activity in the brain; useful for people who get seizures), Magnetic resonance imaging (MRI)
- Nature: individual differences

You can measure
- Behaviour: accuracy, reaction time
- Single cell recordings: action potentials (electrodes)
- Event-related potentials: look at voltage change (average)
- Functional MRI: find activation areas—signal changes, how much blood…where? When? Doing?

Lecture 4: Protection of human participants, learning from an ugly past…

PROTECTING PARTICIPANTS

The Nuremburg code (1947): applies more to medical than behavioural studies
- Informed consent (the right to say no and a briefing about the study and associated risks)
- Human research based on animal work
- Benefits outweigh risks?
- Qualified people must run the studies
- Physical and mental pain must be avoided (including physiological distress)
- Injury or death must always be avoided

Declaration of Helsinki (1964)
- Federal funding is tied to agreement w/ Nuremburg code

Belmont report (1979)
- Respect for persons: choices must be respected
- Beneficence: compensation
- Justice: no coercion or exploitation

Sensitive populations

- Children: parental consent and child assent; more layers of risk to consider
- Prisoners: samples of convenience, coercion is often involved but they still have rights!

Institutional Review Boards (IRBs)

- Every proposal is reviewed and given a fair assessment of benefits/risks
- Renewed annually and updated… these boards are established wherever research is conducted
- Participants (human) and subjects (objects)

EXAMPLES OF CAUSES FOR ETHICS INSTUTUTIONS

Tuskegee syphilis study

- Untreated course of syphilis in African americans in southern USA (lead by gouv't)
- No access to treatment even when it was made available, observed the effects
- Lack of informed consent, deception, w/holding info and available treatment, putting people at risk, exploitation of a group, no briefing

Witchita Jury case

- Attorney's comments on jury deliberations; jurors were taped→ fear of future tapping, later banned
- Compromising the integrity of a social institution, lack of informed consent, invasion of privacy

Milgrim's obedience study

- Advertised as a learning experiment, told that they would teach word association, every error→ increasingly strong shock delivered, tested how people respond to instruction, how far would people go?
- 63% went to XXX; fatal shocks and continued despite hearing groans and later no noise at all
- Easy to do wrong when you're distanced (bomb vs machete)
- Deception, unanticipated psychological harm

Zimbardo's prison study

- Roles and attributions: how quickly people took on roles and conformed
- Participants lost sight of reality (including zimbardo), guards abused 'prisoners'
- Harm to subjects, lack of neutrality as a researcher

Accidental death

- Bronchoscopy: 19yr old undergraduate (sensitive pop)
- Excessive lidocaine used and resulted in death 2 days later
- Exploiting a vulnerable population, inadequate informed consent

Restaurant letter study

- Tested restaurant response to criticism; fake complaints, firing resulted and lawsuits were filled
- Deception, lack of informed consent, infliction of emotional distress

Lecture 5: Statistics and psychology, descriptive and inferential statistics

DESCRIPTIVE STATISTICS

- Used to summarize and examine data
- Allows us to view data buy not examine whether there are significant differences for comparisons of interest

Measures of central tendency

- A stat that represents many observations
- Mean: average
- Median: middle value (not influenced by ouliers)
- Mode: most common
- Outliers: abnormalities (really high or low scores)

Measures of variability:

- A stat that describes the degree to which scores in a set of numbers differ from each other
- Range: highest-lowest
- Standard deviation: tells you how spread out the data is from the mean (dispersion of data, relative to others)
    - Majority falls close to the average (67%)

Measures of relations:

- Degree to which two variables are related
    - Scatterplot: can a trend be found? Variability, dispersion, (line of best fit)
    - Correlation coefficient: positive, negative, none (range from -1 to +1)
        - Strong positive correlation (.99)
        - Weak positive correlation (.12)
        - Weak negative correlation (-.12)
        - Strong negative correlation (-.99)
    - Correlation does not necessarily equate causation

Viewing data

- Histogram: (exam scores by percent)
- Grouped histogram: (exam scores by 10% intervals)

INFERENTIAL STATISTICS

- Use data to make logical inferences about the population
- Determines whether there are meaningful differences in samples

Key factors

- Looking at the # of people in the sample
- Variability b/w each group
- Variability w/in each group
- Statistical significance: 5% or less is attributed to chance

Lecture 6: Gene, chromosomes and traits & genetic influences on behaviour

EVOLUTION

Variability

- What mechanisms contribute to variations in cognition and behaviour?
- Nature: genetic influences (what you're born w/)
- Nurture: environmental influences

Natural selection

- Two components: variation is required (genotypes and phenotypes) and competition for limited resources
- Theory:

- Reproductive success
- Biological evolution (genes change)
- Adaptive (helps w/ survival) vs deleterious traits (leads to death)

BIOLOGICAL FOUNDATIONS

Vocabulary

- Genetics: study of genes, how they are passed on and how they differ
- Heredity: sum of inherited traits and tendencies
- Genes: small units of DNA that direct the synthesis of proteins and enzymes
- Genome: a total/complete set of genetic material
- Proteins: strings of AAs, 3 nucleotides (codon) = 1 AA
- Enzymes: govern processes, control cell structure and function
- DNA: sugar base w/ phosphate and nucleotides
- Phenotype: outward expression of an org's genotype
- Genotype: organism's genetic makeup
- Chromosomes: threadlike; in nuclei of cells, contain genes
- Meiosis: cell division; new sperm and ova, randomly rearranged, contains 23 indie chromosomes when done (1/2 of those found in other cells)
- Sex chromosomes (23^{rd}) and autosomes; girls are XX and boys are XY
- Alleles are variations of a gene
- Dominant traits: if present = phenotype b/c they suppress recessive traits
- Mutation: accidental alterations in DNA code w/in a single gene (environmental or spontaneous)
- Hayflick number: each cell can go through a limited number divisions before death (~50 in humans)
- Telomeres: Every reproduction of a cell, you lose a part of the telomere (which his at the end), eventually, you'll lose DNA when the telomeres run out which means you lose DNA → you can monitor your ageing

GENETIC INFLUENCE ON BEHAVIOUR: DISEASES/CONDITIONS

Down Syndrome

- Chromosomal aberration: rearrangement of genes w/ chromosomes or change in total # of chromosomes
- Trisomy 21 (3 chromosomes instead of 2)
- Physical characteristics: facial
- Mental retardation: 2 standard deviations below the mean
- Alzheimer's disease: much earlier (30-40yrs old), is chromosome 21 related to alzheimer's?
- Likelihood of a child born w/ it incr w/ the age of the mother

Huntington's disease

- DNA base repeat (CAG on chromo 4); more times repeated = more severe, damage to basil ganglia (it dies)
- Progressive neurodegenerative disorder (gets worse and worse, damages brain cells)
- Onset around 40 yrs old, time course 10-15 yrs; mothers rarely know they have it before giving birth
- Abnormal movements; chorea, athetosis; hands keep moving, uncontrolled body movement
- Behavioural changes: depression, moodiness
- Global cognitive impairment: dementia is common; impaired memory

Phenylketonuria

- Autosomal recessive disorder, if blood levels of phenylalanine rise = severe brain damage
- Inability to convert phenylalanine (found in food & artificial sweetner) to tyrosine
- Build up of phenylalanine causes impaired brain development, mental retardation & seizures
- Manageable if caught early; just stay away from it

PSYCHOLOGY 101: INTRODUCTION TO COGNITIVE AND BEHAVRIOURAL PSYCHOLOGY

GENETIC INFLUCENCE ON BEHAVIOUR: OTHER

On learning:
Tryon's rat maze experiment

- rats were bred according to their intelligence as determined by maze performance
- After 7 generations of breeding, rats were clearly grouped "bright" and "dull"
- Effect of the environment was not really taken into account… can you really breed learned rats in the enviro?

Other approaches

- Genetic engineering: ethical issues! Changing genes!
- Knockout mutation: you can 'knock out' genes in animals (make them inactive)

On family

- Identical twins: 100% same genetics, Fraternal twins: 50%, same as siblings
- Genes are related to intelligence (correlation of intelligence scores to identical twins living in separate houses)

Lecture 7: Exploring environmental influences

What genes can do

- Genes influence health
- Genes influence behaviour
- Genes may give us upper and lower boundaries for diff domains
- Interaction w/ enviro is the second piece to the puzzle of human variability

ENVIRONMENTAL INFLUENCES

What are the environmental factors?

- Influencing intelligence: substance abuse, resources (books), family encouragement, culture, nutrition
- Influencing personality: phys appearance, upbringing, friends, pop culture, social status, trauma to the brain, nutrition, generation
- Influencing your well-being: prevalence of disease, living cond't, nutrition, education, relationships, stress

ENVIRONMENTAL INFLUENCES DURING DEVELOPMENT

Fetal Alcohol syndrome

- Alcohol during pregnancy: toxin teratogen affects fetal development
- Facial birth defects: space b/w nose and upper lip is bigger
- Neurological damage; brain has less wrinkles and is flatter (less neurons) and smaller
- Difficulties w/ learning and memory issues, staying in school and independence issues

Genie

- Locked up in a basement until the age of 13; never got to hear voices or talk
- Very thin, hunched, grunted and smelled everything like an animal
- Poor language development, no language explosion, right side of the brain was working very hard
- Brought up the critical period idea: window of development… if you don't learn then, you won't be able to learn it later on (loss of natural ability)… can you ever recover language?

Malleability of intelligence in children w/ low SES

- Kids w/ low socio economic status make up a large proportion of kids at school w/ low test scores (1 SD below)

- Trained kids: games for 75 mins/day, 2 days/week for 8 weeks
- Results improve dramatically; matrix reasoning and cognitive speed

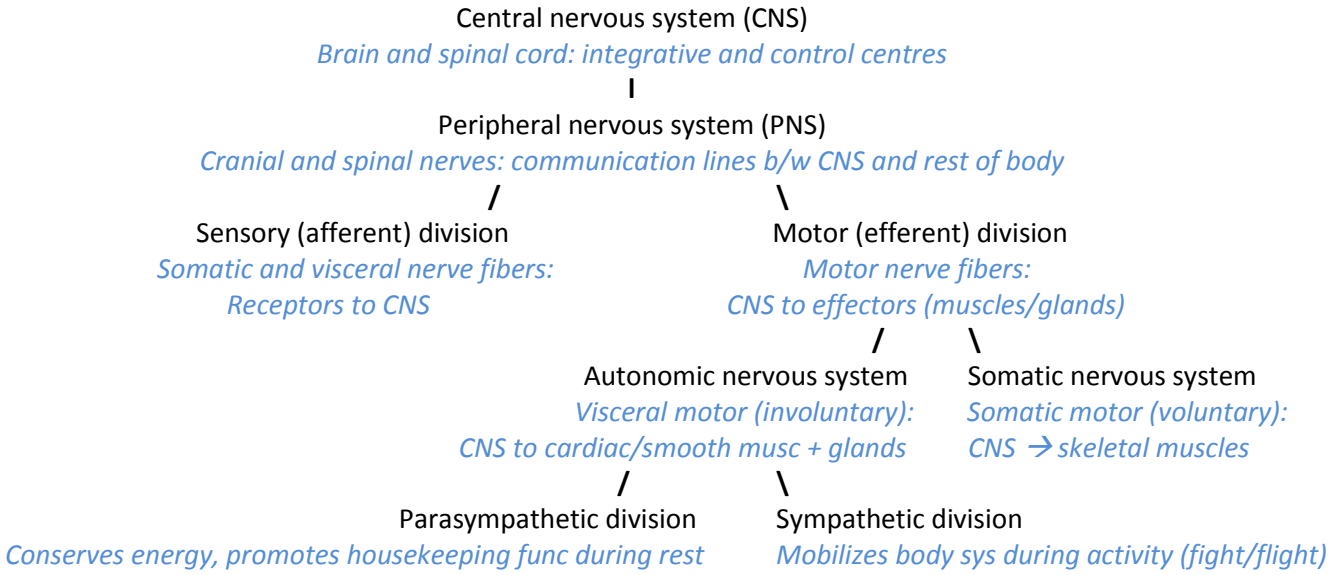
ENVIRONMENTAL AFFECTS ON STRESS AND HEALTH

Stress
- Body: physiological response, Mind: psychological response
- Characs: internal vs external, positive vs negative, internal vs external locus of control (can you do anything?)

Physiological stress response
- Hypothalamus → (releasing factor) → Pituitary gland → (hormone ACTH is released thru blood) → adrenal gland → (releases coritisol and catecholamines)
- Chronic stress = high levels of cortisol, in the long run it can damage health
- Immune sys: susceptibility to illness is incrd, slower healing
- Cardiovascular health: hypertension, coronary heart disease, stroke (can all be caused by poor diet +smoking)
- Fatigue: poor sleep, constantly feeling exhausted

Psychological stress response
- Diathesis stress model (behaviour is a result of biological and genetic influences)
    - Schizophrenia (stress affects the onset)
    - Depression and bipolar disorder (stress affects the onset)
    - Post traumatic stress disorder: flashbacks (ppl w/ sm hypothalamus' are more likely to get it)
- Cognition: racing thoughts, worries, mind goes blank, overall performance suffers
- Emotions, mood: irritability

Lecture 8: Divisions of the nervous system



Autonomic nervous system
- Sympathetic division: Fight or flight: stress activates this and puts other non-necessary systems on hold
- Parasympathetic division: rest or digest; reactivates suppressed actions

Activating the sympathetic nervous system
- Cortisol: stress hormone, incr levels can lead to organ damage

- Catecholamines: epinephrine and norepinephrine (ep: dilates pupil, incr HR)

Somatic division (efferent signals)
- From brain to body
- Motor neurons and acetylcholine (Ach) → chemical needed : causes musc contraction, promotes memory
- Curare (Ach antagonist) → blocks Ach needed to move or breath

Sensory division (afferent signals)
- From body to brain
- Pressure: mechanoreceptors
- Pain: nocireceptors: A delta fibers, C fiber (slow throbbing pain), hereditary sensory autonomic neuropathy (can't feel pain)
- Temperature: thermoreceptors
- Proprioception: proprioceptors ; knowing where your body is in space (tells our body our muscle position)

Central nervous system
- The brain: 3lbs, 100 million neurons, 10 trillion connections
- The spinal cord: Cervical (7), thoracic (12), lumbar (5) and sacral (5)
- Scoliosis: irregular curvature of the spinal cord (s-shaped spine affects posture)
- Spina bifida: incomplete closure of neural tube (exposed spinal cord at birth)
- Paralysis: affects limbs below the injury
    - Paraplegic: paralysis of lower half of one's body
    - Quadriplegic: paralysis of all four limbs
- Reflexes: sensory neuron → interneuron → spinal cord (no need for brain, only 3 neurons needed)
    - The brain can control them (like holding hot things)
    - Babinski and snouting: infant reflexes whose absence could indicate brain damage
    - Babinski: fans out their toes when you touch them, snouting: pursed lips when you touch nose

Lecture 9: Glia and neurons, electrical transmission

CLASSES OF BRAIN CELLS

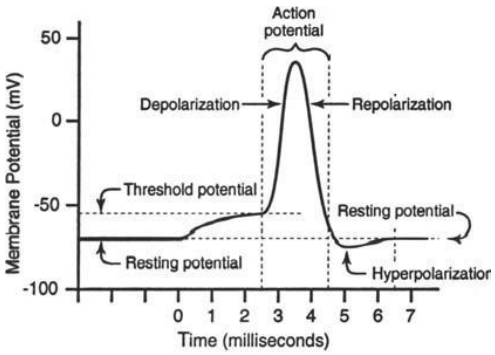
Glia: Support cells
- Astrocytes: starlike; guide development of neurons
- Microglia; 'scavengers'; eat dead and injured cells
- Schwann cells: around neurons; speed up signals by insulating
- Oligodendrocytes: central; covers a few neurons at a time; also helps w/ speed of signals

Cancer of the brain
- Meningioma: glial cells grow uncontrollably (are cancerous), occurs in space b/w brain and skull, clear definition of boundaries so easier to remove
- Astrocytoma: astrocyte is cancerous, progresses quickly, it occurs in the brain; fills up the ventricle (fluid areas), you can't see the border so its hard to remove

Sensory neurons
- (somatosensory) touch, pressure, vibration, proprioception, temperature, pain
- Visual (light), auditory (sound; cochlea hairs; vibrations)

Motor neurons

- Somatic nervous system; controls movement, spine to muscle (chemical needed: Ach)



- Innervate the body from appropriate levels of the spinal cord

Interneurons

- Neither sensory nor motor, mostly in the brain but also in the spine for reflexes
- Types of info carried; for communication purposes; reasoning, language, computing, memory

A basic neuron

- Soma: metabolic activities
- Myelin sheath (speed from alegodendrecyte)

Flow of information

- w/in a neuron: electrical
- b/w neurons: chemical

Electrical transmission

1. Receive signals from other neurons EPSP (+) or ISPS (-), resting -70mV
2. If the threshold (-45mV) is met, action potential occurs (all of none princ.)
3. Depolarization occurs (positive ions rush in)
4. Repolarization (positive ions rush out)
5. Hyperpolarization (overshoots; more negative than usual)
6. Return to resting potential

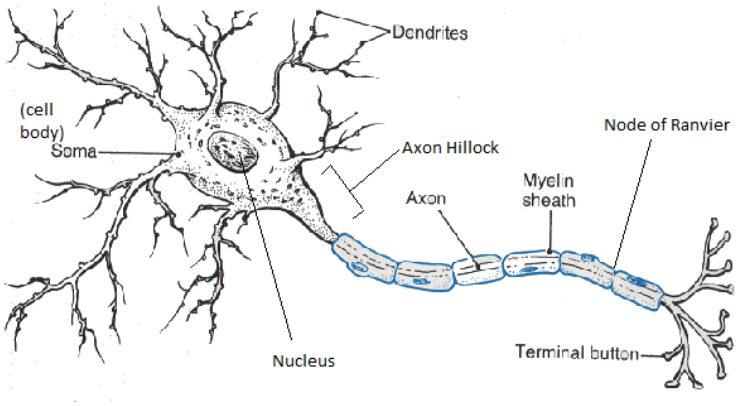
*** size of action potential never changes; # of signals sent = intensity

Signal propagation

- Electrical signal travels down the axon via saltatory conduction (jump in Spanish)
- Regeneration of action potential signal (in node of ranvier)
- Magnitude will be the same at the end

Multiple sclerosis

- Progressive disease of myelin in CNS



- Signal fades out (no regeneration) and it doesn't reach the terminal button
- Immune system attacks myelin (mistakens it for an invader)→ autoimmune disorder
- You have to take a drug to suppress the immune system

PSYCHOLOGY 101: INTRODUCTION TO COGNITIVE AND BEHAVRIOURAL PSYCHOLOGY

Lecture 10: chemical transmission, types of neurotransmitters (and their effects)

THE SYNAPSE

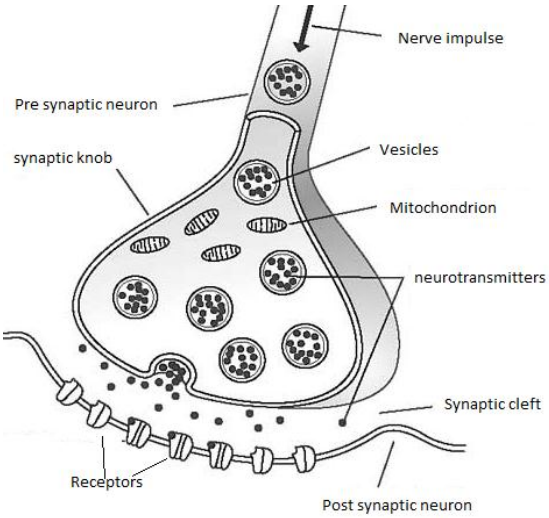
Anatomy Chemical Transmission

1. Action potential reaches terminals
2. Ca+ ions flood in terminal, cause vesicles to go to membrane
   (binds to vesicles, vesicles then move)
3. Vesicles release NT into the synaptic cleft (exocytosis)
4. NT travels across the cleft to post synaptic neuron
5. NT binds w/ appropriate receptor, results in change of membrane potential (opens ion gate, + ions enter or – for inhibitory signals)
6. After NT binds and has effect, it falls off the receptor
7. Removing the NT; by reuptake (pre synaptic sucks it back up into a new vesicle) or by enzyme deactivation (break it down)

** how do neurons have diff functions?
By connectivity (location) and neurotransmitters; distinguish by the chemical sent (motor, sensory, interneurons (90%))
MAJOR NEUROTRANSMITTERS

- Agonist: (incr NT effect): incr NT production and release, blocks deactivation or reuptake
- Antagonist: (decr NT effect): block NT production and release, blocks receptors or prevents binding

Glutamate
- Learning, memory, most important excitatory NT
- All sensory organs send signals using axons which release glutamate, NMDA (glutamate receptor)
- Produced all over the brain
- Alcohol: impairs its function

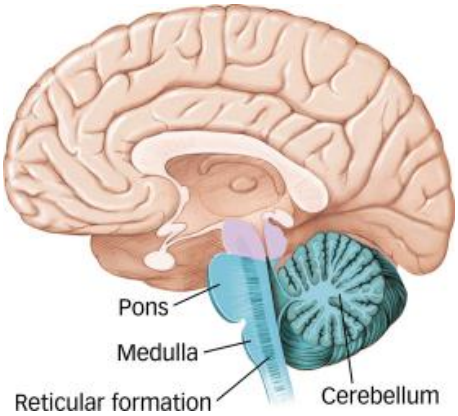


GABA
- Relaxant, depressant, inhibitory NT
- Barbituates, benzodiazephines
- Valium: painkillers that easily lead to addition and w/drawal

Acetylcholine
- Muscle action/movement, attention, learning, memory
- Produced in the basal forebrain
- Related to addiction
- Botulinum (botox): freezes muscles, prevents contractions
- Alzheimer's: too like Ach b/c basal forebrain dies (drop in Ach levels)
- Black widow spider, curare
- Aricept: drug that incr the amt of Ach, stalls progress and is for people w/ memory problems

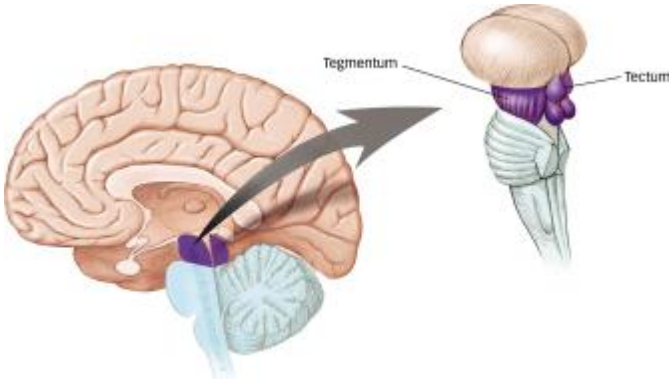
Dopamine
- Movement, motivation, arousal, attention and learning, CRITICAL NT
- Parkinson's disease and L-DOPA (incr dopamine levels by converting): part of the brain that produces dopamine dies in park. And you don't know that you have it until 90% of the neurons in that part of the brain dies

- Tardive dyskinesia: too much, can't stop moving (like huntington's)
- Schizophrenia symptoms: too much; hallucinations (LSD is the dopagonist)
- Cocaine and amphetamines prolong the effects
    - Reinforcement: when it feels good you get addicted
    - Substantia nigra: supplies brain for movement, when it dies (in parkinson's) you can't move anymore
    - Clozaril: drug to treat psychosis; schizophrenia



Serotonin

- Mood, hunger, sleep, arousal, aggression
- Anti social behaviour when levels are low (deficiency)
- Raphe Neucleus
- Regulation of pain: more = block pain
- Depression: you have low levels of serotonin
- SSRIs: drug (selective serotonin reuptake inhibitor) that keeps levels (for depression)
- Tryptophan, Prozac, Zoloft : for depression, incr levels by blocking reuptake



Norepinephrine

- Arousal, vigilance and attention
- Tricylic antidepressants : serotonin and norepinephrine activated
- You wake up when its starts circulating
- Asthma: norepinephrine shots are needed to wake up
- Production: Locus corelius (in the brainstem)
- Elavil: trycyclic antidepressant

Endorphins

- Acts w/ pain/emotion centres
- Endogenous opiates
- Excitement, pain, orgasm, "runner's high"
- Puberty: pituitary gland, hypothalamus

Lecture 11: gross neuroanotomy

MAJOR PARTS OF THE BRAIN

Hindbrain

- Kids get brain tumours in this area (adults in cortex)
- Pons: bridge b/w cerebellum and cortex (rest of brain)
- Medulla: controls vital functions (breathe/HR/swallow)
- Cerebellum: important for fine movement like writing, walking, Drinking… damage = problems w/ movement
- Reticular formation: responsible for consciousness so damage = death

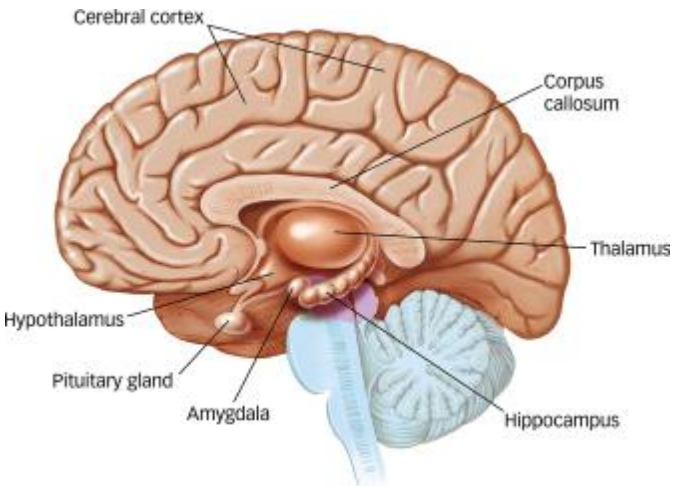
---

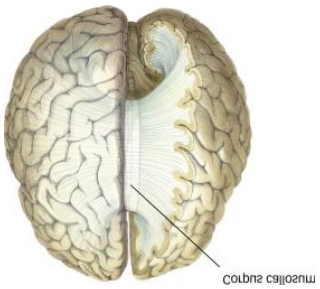
Midbrain

- B/w hind and forebrain
- Tectum: inferior colliculus: localizes sound
- Superior colliculus: localizing space (vision)
- Tegmentum: contains substantia nigra (which is resp. for creating dopamine and sending it off)

Forebrain

- Cerebral cortex: wrinkles
- Corpus callosum: axons connecting L&R brain (bridge)
- Thalamus: 'sensory gateway', senses go here 1st & are processed elsewhere (excluding smell), responsible for basic processing (lines &curves)
- Pituitary gland: sends hormones (stress, puberty)
- Hypthalamus: controls pituitary (fight, fleeing, reprod, feeding)



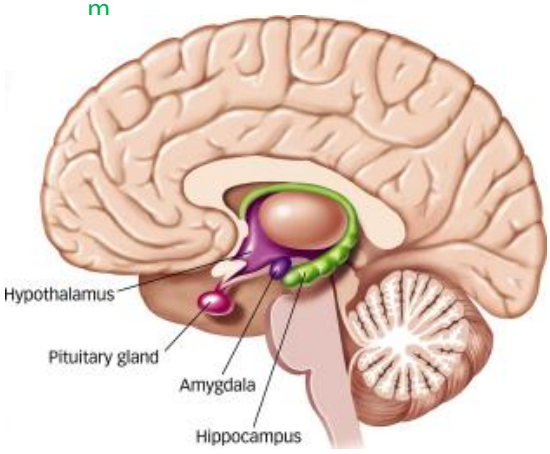


Corpus callosum

- Connects L&R sides
- Epilepsy/seizures: cut CC to stop signals from going b/w
- Alien hand synd: hands act in opp
- Cutting: like having two brains
- Each region of the association cortex knows whats happening to corres region on opp side of brain

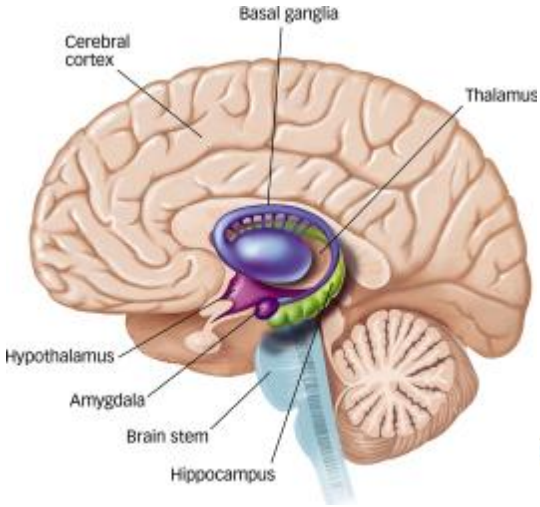
Forebrain: Limbic system (subcortical)

m



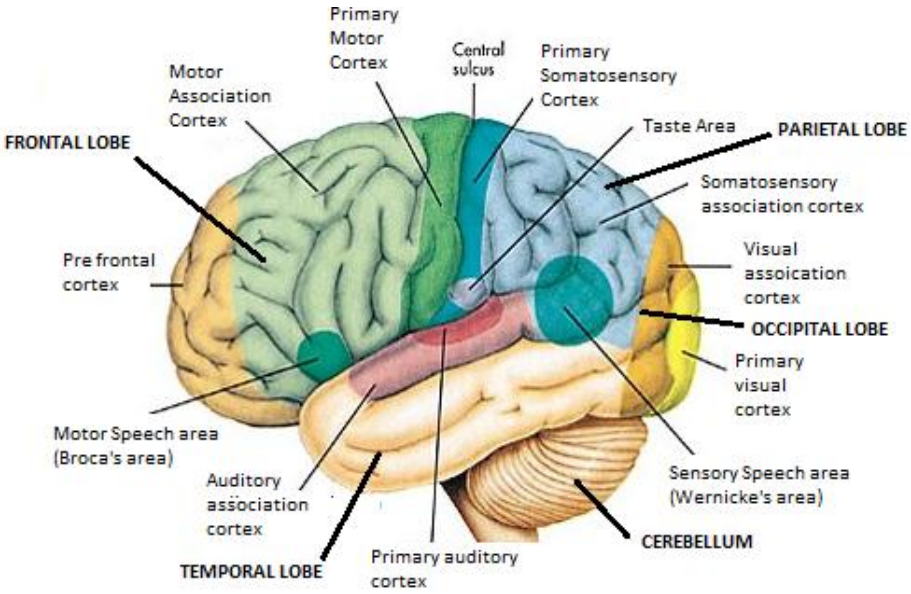
cesses emotions

- Hippothalamus: critical for making new memories



Forebrain: Basal ganglia (subcortical)

- Basal ganglia: wrapped around thalamus
  - Initiates movement
  - Dopamine is sent here
  - Can lead to parkinson's w/out dopamine
  - Damage can lead to huntington's



Forebrain: Cerebral cortex

- Central fissure (b/w frontal & parietal lobes)
- Gives rise to language, reason
- Covers the brain, Anterior = frontal, posterior= occipital
- Folded: to fit more
- Gyrus (gyri): bulge, sulcus (sulci): dips/creases

Frontal lobe

- Very developed, gives rise to functions unique to humans
- Movement: has neurons that connect it directly to the spine
- Sp production: tongue/mouth/larynx
- Higher order cognition (planning, controlling behaviour, language)
- Stroke in frontal lobe = loss of language production abilities
- Damage = paralysis on opposite side (+ deficiencies in foresight, loss of self awareness, loss of spontaneity)

Parietal lobe (somatosensory)

- Touch perception: contains map of the body (so you know where you are being touched): somato cortex
- Spatial localization/perception: where things are in space (map of enviro) & attention is related
- Damage to left association cortex (loc of moving parts); read + write but can't talk or make precise hand move.
- Damage to right association cortex (spatial tasks); perceptual problems (see parts but not the whole)

Occipital lobe

- Visual processing (colour and movement)
- Lesion in primary visual cortex produces a hole in a specific part of field of vision
- Damage to lobe; blindness, colour blindness
- Damage to primary: blindness (hole in map), in a specific part of the field of vision
- Damage to association: lose ability to recognize (visual agnosia)

Temporal lobe

- Contains primary auditory and auditory association cortex
- Audition: dissects sounds, also translates sound to meaning

- Where memories are stored (people, objects)→ can lose diff types of knowledge through damage
- Damage to primary = hearing loss
- Damage through stroke: can't understand language
- Damage to left association cortex: language defecits
- Damage to right association cortex: difficulty recog non-sp sounds

Topographic organization in the brain
- If you 'slice' the brain at the central sulcus (b/w temporal and parietal lobes) and looked at a 'disk'
- Legs & feet at the top, then hands, and then face, tongue, pharynx, esophogus

Lecture 12: Stoke and trauma brain injury

STROKE

In general
- Stroke: part of the body has no blood supply (cell death: quick in the brain)
- Usually leads to death or disability; 3rd leading cause of death
- 300K stroke survivors alive today in Canada, 6.4M in the US
- Risk factors: Hypertension (from stress), smoking (damages vessels), diabetes (damages small vessels) and hypercholesterolemia (high cholesterol, fat in vessels, arterial plaque), sedentary lifestyle

Ischemic strokes
- 80% of all strokes: blockage of blood supply (it gets cut off)
- 2 types
  - Thrombotic (60%): plaque builds up in the vessels (age: loss of elasticity)
  - Embolic (20%): embolism: sudden cut off due to air bubbles, blood clots (common for ppl w/ heart sugery)

Hemorrhagic strokes
- 20% of all strokes: blood vessel bursts (explodes!)
- Aneurysms
  - Vessel has weak walls (so it bulges out)
  - If it doesn't burst you won't know its there (no feeling)
  - Likely to develop at base of brain where a lot of arteries are
  - 1. Incrs pressure in the brain and could push on the brain stem; causes loss of consciousness
  - 2. Fresh blood on neurons kills them (toxic in the brain!)
- Intracerebral haemorrhage (bleed in brain)
- Subarachnoid haemorrhage (bleeding in subarachnoid space)
- Haemorrhage: headache, a lot of pain…migraine like pain

Transient ischemic attack (TIA)
- Temporary blockage that causes stroke-like symptoms
- Take blood thinners to incr flow of blood throughout the body

TRAUMATIC BRAIN INJURY

In general
- 1.4-1.7 million TBIs annually in the US, 80k are left w/ long lasting problems annually
- Affects males more than females… why? b/c men are more likely to do stupid things
- Causes (civilian): falls (28%), car crashes (20%), struck by/against events (19%)

- Blasts for military personnel: roadside bombs

Brain injury

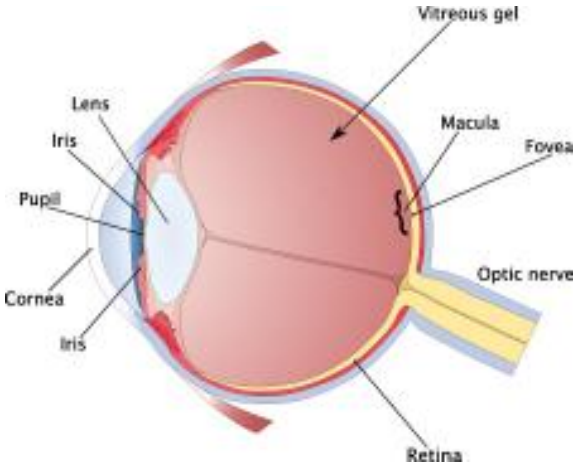
- Coup injury: 1st motion of hitting head against something, contrecoup injury 2nd motion of smashing back
- Closed vs open brain injury….less likely to survive if its open!
- Ridges in the back of the skull will slash brain upon movement, back of skull is smooth though (occipital lobe)
- Primary points of injury are the frontal lobe (esp in fights) and the temporal lobe
- Focal: bleeding & contusions:
    - bruises on the brain
    - common for car crashes (frontal and temporal lobes)
- Diffuse axonal injury:
    - caused by significant acceleration/deceleration injury→ stretching of axons
    - Compression: slam front
    - Tension: slam back
    - Shearing: rare (extreme case): doesn't grow back
    - Brain stem stress: loss of consciousness (damage during comas)
    - Bad axonal injury: longer period of unconsciousness
    - Motor tract through spine: largest from frontal lobe to the spine, a lesion = cognitive problems (language, attention and memory)
- Recovery: long uncon = longer recovery
    - Memory loss of events before incident…even after

**** lecture 13: midterm*
*****lecture 14: videos: woman experiencing a stroke and Zimbardo talking about evil*

Lecture 15: principles of sensory processing, ocular anatomy and basic visual processing

In general:

- Sensation
    - Transduction (bringing info from enviro & making it a neural signal)
    - Receptor cells (pick up info); tailored to specific sense
- Perception: making sense of signals; process of interpreting signals
    - Anatomical coding: diff features are coded by the activity of diff neurons, interprets location & type; diff features are coded by activity of diff neurons
    - Temporal coding: diff features are coded by the pattern of activity of neurons, int intensity (using time)
    - Height of action potential is always the same so the diff number of AP is based on intensity (more sensing = more action potentials)



Vision

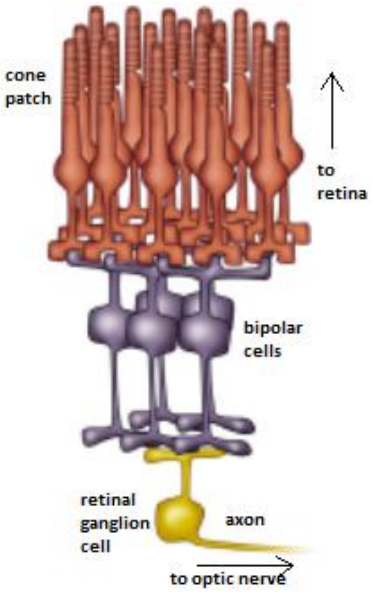
- Optic chiasm in the middle
- Left optic field and right optic field cross in the middle
- Light energy: Length (colour), amplitude (brightness), purity (saturation)

Eye anatomy

- Pupil: opening in the eye: photons enter here, size is controlled by the iris (when its bright, it gets smaller…dilating duties!)
- Lens: disk that helps send image to back of eye (through refraction), inverts the image
- Fovea: contains receptors (lets you see HD), concentrating (aka foveating—seeing clearer)
- Blindspot: where optic nerve leaves the eye, no photoreceptors there
    - What 1 doesn't see, the other will fill in the gaps
    - If you cover one eye, the brain will fill in the blind spot (educated guess)
    - Movement also helps fill the gap

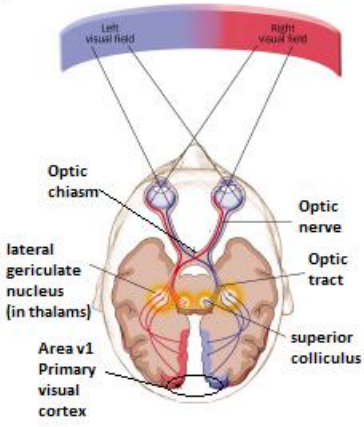
The dysfunctional eye

- Nearsightedness: eye is too long: requires concave lens
- Farsightedness: eye is too short: requires convex lens
- Catarcts: blurry lens so image sent is also blurry (ageing; eye turns yellow)
- Glaucoma: too much pressure, fluid gets trapped and puts pressure on the optic nerve
- Macular degeneration: retina degenerates (mac lines up w/ fovea so central focus is destroyed), hallucinations occur if brain tries to fill in the blind spot
- Retina tear: fluid gets thinner and sneaks under retina, tearing it off (ageing) and you lose vision where its torn (can also occur due to trauma)
- Papilledema: brain swells and pushes the optic nerve out (must immediately release/relieve pressure)
- Colour blindness: cone based blindness: common red/green blindness (1/11 of men: sex linked gene)



The fovea

- Rods: for black & white vision, seeing in the dark & periphery (120 million photoreceptors away from the fovea)
- Cones: for colour vision & fine resolution (7million centered in the fovea)
- Photoreceptors near capillary beds for access to energy/nutrients (back of retina, being cells, 1 cell= 10cones)
- Group of ganglion cells forms the receptive field of a cell in the brain
- On center cell is stimulated when centre of field is exposed to light and inhibited when the surround is exposed to light (opp of off center gang.)
- Numerous (overlapping) receptive fields help map precise info)



Transduction

- 1. Light enters the eye through the lens
- 2. Image (on lens) is refracted back to the retina (image inverted)
- 3. Reaches back of eye, activates rods/cones
- 4. Bipolar+ ganglion cells summarize info (info as few neurons as possible), head to exit the eye (forward)
- 5. Info leaves via 'blind spot'

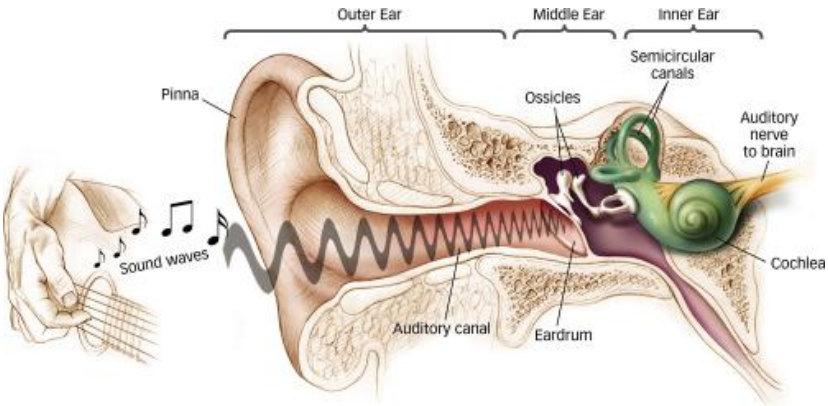
Information leaving the eye (via optic nerve)

- Visual fields (each eye has ½ the visual field)
- Optic chiasm: nasal fields cross, visual field (Rside of space on Lside of brain)
- Connection to thalamus: LGN of the thalamus (all sense but smell)
- Connection to occipital lobe (primary visual cortex)
- Optic nerve damage/cut: loss of outside/peripheral vision (tunnel vision) also happens when tumour in pituitary gland

- *** inverted & opposite; blank in upper left field = damage lower right lobe

Colour processing

- Trichromatic theory: pattern across cones yields unique colours (blue red green are primary colours)
- Colour opponent theory (some colours work against others (Red/green, blue/yellow, black/white), explains image after effects
    - If red is really activated, you see red… if not, the complement is activated (green)
    - After image: an image continuing to appear in vision after the exposure to the original image has ceased



Lecture 16: auditory, vestibular, gustatory and olfactory anatomy and processing

HEARING

Sound

- Frequency (how long): pitch measured in Hz, amplitude (how high): loudness measured in decibels, complexity: purity and timbre
- Localization (tegmentum and tectum): trouble when sound is right in front of behind, if not, which ear did the sound hit first?
- Interaural timing computed w/ help of tectum (inf colliculus)

Anatomy/functions of the auditory system

- Sound enters the ear (pinna captures, canal funnels)
- Waves hit ear drum
- Ossicles move (amplify sound)
- Causes change in cochlea (bangs on it)
- Cochlea: changes movement to neural signal
    - Move. causes fluid in cochlea to move
    - Hair cells bend and send signals
    - Basilar membrane has hair cells (cilia) that correspond to diff frequency
    - High frequency at the front, low at the back (high ones are usually damaged), but low at very tip

Auditory perception in primary auditory cortex (A1)

- Wernicke's area; chops up sound (damage = loss of ability to understand sp)
- More complex sound info (ex sp) continues to more advanced processing in the temporal lobe)
- Temporal and place coding

Balance and orientation

- Vestibular sys; key for balance (works w/out vision) but changes w/ age (seniors falling)
- Semicirular canals: (3) for 3 directions : yaw, pitch, roll
- Motion sickness: occurs when vision and audition say diff things (nausea)
    - Dramamine/scopolamine: gravol: sleepy/drowsiness/acts on nausea: supresses it

Dysfunctional auditory processing

- Conductive hearing loss
    - ear wax: as you get older
    - Ruptured tympanic membrane: due to incr pressure or a loud noise
    - Otosclerosis: last ossicle is stuck to the ccochlea (non-moving bones)
- Sensorineural hearing loss
    - Damage to auditory nerve: signals don't reach the brain (trauma, virus), vertigo (loss of balance)
- Damage to cilia: loss of high frequency sounds (w/ age), hair cells don't grow back!
- Tinnitus: ear ringing: perception of sound w/out external stimulus
- Use of a hearing aid: amplification of external sounds (older: helps w/ sp comprehension)

TASTE

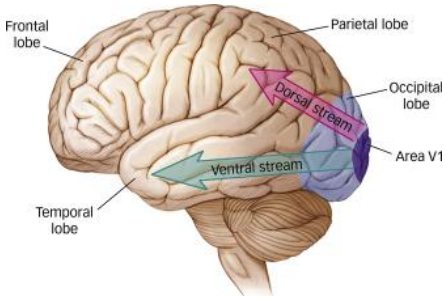
In general:

- 5 tastes: salty, sweet, bitter, sour and umami (msg)
- Papillae and taste buds (binds, taste buds get activated)
- Gustatory cortex (anterior insula)
- Cravings(from brain) w/ age: taste sensitivity decrs (salt and pepper)

SMELL

In general:

- Olfaction and the olfactory epithelium (layer smell cells)
- Small number of receptors but lots of smells
- Cross modal integration w/ taste
- Sucking in chemicals that bind to diff receptors (diff odor = diff combo of activated cells)
- Changes w/ age
- Anosmia: brain trauma: lose olfactory sense (can't smell)
- Alzheimer's: loose smell receptors: can't tell if they stink



Lecture 17: visual perception and illusions, dorsal and ventral streams of processing

In general

- Perceptual segmentation: slicing/dicing experience & seeing objects, segregating b/w hand & what its touching
- Object constancy: seeing the same 'G' in diff ways
- 2D image on the retina in the brain is reconstructed to a 3D image (we see 3D)
- Despite the inversions: image on retina is upside down and the signal gets switched at chiasma

Streams

- Signal goes to thalamus → occipital lobe (lines curved/straight & colour) → ventral stream → temporal (recognize and identify)
  → dorsal stream → parietal lobe (localize things in space)
- Spatial neglect: damage to R parietal: drop left side of body (don't think its there)

Binocular disparity (each eye sees diff things)

- Stereopsis: take 2D info and construct 3D in brain
- Info from both eyes sent to one hemis but each eye sees slightly diff images
- Cue for perceiving depth, allows fine tuning of perceptual motor abilities, effective at close range

Monocular and binocular distance cues:

- Linear perspective: things fade in the distance…vanishing point (where you can no longer see distance)

- Familiar size: if an adult elephant looks small, it must be far away
- Motion parallax: close by = super fast, mountains: slowwwwwww

Pictoral cues of special depth

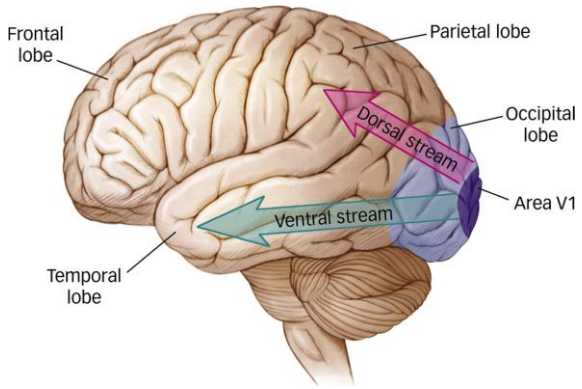
- Interposition: relative to a something else (is the person in front or behind the car?)
- Elevation: if two things are the same size but diff distances away, the farther one must be bigger
- Shadowing: sun from which side?
- Linear perspective: vanishing point
- Texture gradient: more detail= closer up

Other

- Determining size illusions
  - Extra contextual info clouds judgement, Muller-lyer line: arrows facing in or out…
- Determining orientation and tilt illusions
  - Hashed lines: extra clouding info, Witkin's rod-from illusion and the zollner illusion
- Gestalt principles of visual organization
  - Proximity: elements located closest to each other are perceived as belonging to the same figure
  - Similarity: similar elements are perceived as belonging to the same figure
  - Closure: elements missing from the outline are filled in by the visual system (percep of depth, backg)
  - Good continuation: given 2+ interps of elements that form the outline of the fig, simplest is preferred
  - Common movement: elements that move together give rise to the perception of a particular figure
  - Good form: when we see complex thing we break it down

Special classes of objects: faces and houses

- Faces: fusiform face area: bottom of temporal lobe: activates when ID faces
  - Expertise processing: faces: understanding expressions
  - FFA: important to being an expert: mechanic's FFA will light up when shown cars
- Places: parahippocampal place area: processes scenes (houses): near hippocampus
- Category specific loss of knowledge
  - Limited to single categories: people, animals…
  - Trauma: front temp lobe: can't recog people



Matching visual input to knowledge stores

- Template theory: store every viewpoint of everything you've ever encountered: matching thing- too much info?!
- Prototype theory: represent the ave member of the category: popular (example of meaning)
- Geon theory: recognition by parts (recog table by recog legs and top)

Lecture 18: visual and perceptual brain-based impairments

Occipital lobe impairments

- Blind spots: scotomas
  - Damage to occipital lobe leads to partial or full cortical blindness
  - Since info is upside down and opposite, cant see lower half = damage to top of both occipital lobe
  - Size of blindspot directly related to size of damage
- Blindsight
  - Blind, throw ball & the person will catch→ react to things

- Ability to process some visual input despite a total lack of conscious visual awareness

Ventral Stream impairments

- Achromatopsia (V4? In occipital lobe)
  - Inability to distinguish b/w colours (everything is grey soup)→ perception issue
  - Damage to secondary visual processing areas in the occipital cortex
  - Possible to damage only one hemisphere, so an even split (one sees eye colour)
  - Don't want to eat or have sex… nothing looks the same
- Akinetopsia
  - Cannot perceive continuous motion or judge speed → perception issue
  - Damage to secondary visual processing areas in the occipital cortex
  - B5 puts things together, stream things together (border b/w occipital and temporal lobe)
- Visual agnosia
  - Brain's inability to link visual perception to known concepts for identification
  - Caused by damage to the occipito-temporal region (approx.)
  - Keys: if you put in front (can't ID), shake (noise helps ID)
    - Class 1: Associative agnosia
      - Less severe, can perceive okay, cannot assign meaning to obj.
    - Class 2: Apperceptive agnosia
      - Can perceive basic sensory features
      - Cannot form a visual percept of an object, can't SEE things right

Dorsal Stream impairments

- Optic ataxia
  - Inability to accurately use vision to guide manual actions
  - Damage to the superior parietal lobe
  - You can identify, move limbs (no fundamental visual problems)
  - You can stimulate optic ataxia in normal healthy participants by stimulating part of the brain

Lecture 19: Visuospatial neglect, Balint's syndrome

ATTENTION

In general

- Intentionality: you can control/direct what you are paying attn. to (overt vs covert)
- Unity: focus on one thing at a time (compromised when you divide attention)
- Selectivity: focus on one and shield out other stuff (ADD), the self is special
- Transience: focus on one thing for a certain amt. of time, trade-off b/w sustained

Spatial attention and the parietal lobe

- Parietal lobe: important for mapping out spatial contents and relations
- Damage: sever attentional issues

Visuospatial neglect/hemispatial neglect/neglect syndrome

- RIGHT parietal damage: left neglect; left side of space and body is absent (you can see but can't pay attn.)
- Line bisection task: will say the middle is ¾ through (b/c its ½ of what they see)

- Line cancellation task (cross out only lines on the right side), can be used to track recovery (slowly start crossing out lines closer to the left)
- Drawing: redraw a flower (draw half a flower), draw a clock (draw all # on right), draw a person (only draws the right side)
- Modified line cancellation task (2 columns), cross out right side of each column (suggests that their not only neglecting left side of space but of objects)
- Writing: writes aligned to the right (gets narrower until only 1 word fits)
- Chimeric faces: sees only right side of face
- Houses: choose house that isn't on fire even if they can't see it (is it subconscious?)
- Imagine what the piazza looks like (neglect left), imagine you move 50m to the left (they will describe what they just missed)

Anosognosia: unaware of the existence of a disability or handicap

- Don't recognize the left size (arm and leg)
- Ask for a high five, they don't move but will think they have
- Might try to fight it thinking someone else is touching them
- Theory of spatiall attention
    - Lparietal lobe (processes right side of space)
    - Rparietal lobe (processes both sides of space)
    - So, damage L side, right lobe will pick up the slack, damage R side, left neglect
- Treatment
    - Neglect symptoms will improve and potentially go away
    - Extinction: you can process both sides individually, but if something is going on on both sides at the same time, you'll pay attention to the right side (bias)… residual problem

Balint syndrome (bilateral parietal damage, both sides):

- Complete obliteration of attention
    - Simultagnosia: can only process one thing at a time (looking at a person: see glasses but nothing else)
    - Sticky fixation: hard to disengage, trouble moving eye focus
    - Optic ataxia: using vision to guide action (grabbing)

Lecture 20: Classical conditioning, operant conditioning

Intro to learning

- Associative: learn associations (links w/ things in the enviro)
- Stimuli/Valence: valence (good or bad?)
- Helps us seek out what is good or bad

CLASSICAL CONDITIONING

Ivan Pavlov (1849-1936): digestion and salivation experiment

- Needle in dog's salivary gland, saliva drips out into a tube (collect and study)
- Salivation reflex: when you salivate at the touch of food
- Dogs anticipated and pre-salivated
- Sound (metronome) was presented before and during arrival of meat
- Sound alone soon made the dog drool & then they drooled as much for the ticking as they would w/ food
- New response: conditioned reflex: thought he discovered how animals learned

In general

1. Before conditioning: unconditioned stimulus (food), unconditioned response (salivation)

2. Before conditioning: Neutral stimulus (tuning fork), no conditional response
3. During conditioning: Co present conditioned stimulus (fork) w/ unconditioned stimulus (food) to give unconditioned response (salivation)
4. After conditioning: Conditioned stimulus (fork), conditioned response (salivation)

The process (Very quick)

- Acquisition: learning that the tuning fork = food
- Extinction: unlearning that the tuning fork = food
- First Spontaneous recovery (24hrs later) : more salivation than very first time (extinction occurs after)
- Second Spontaneous recovery (another 24hrs later): more salivation than very first time (less than the day before though) (extinction occurs after)
- Responsiveness to similar conditioning stimuli
    - Generalization: If food given at a specific frequency, more likely to respond to sounds that are similar, further from frequency= less response, but still responding
    - Discrimination: discriminating b/w diff sounds

Classical conditioning and phobias

- Intense and irrational fear of something, 1 bad experience & seeing others afraid can be enough
- Eliminating phobias: Behavioural approach: exposure therapy: think about it, see it, touch it, expose it slowly over time and show you that it's not a big thing

Little Albert

- Others said you can't train someone to be afraid of something
- Before: not afraid of furry animals
- Co presented a loud sound and furry animals (when he reached they made noise)
- Conditioned to fear white rats (whether the noise was presented or not) and other furry animals
- Watson: didn't believe that emotions/mind exists (everything is based on response to environment
- Amygdala: imp to processing emotions

Operant conditioning

- Thorndike: law of effect (if something's good, people will want to do it, if something's bad, they won't want to do it)
- Skinner: operant behaviour: when you change someone's behaviour
- Stimulus presented: incr likelihood (pos reinforcement), decr (pos punish)
- Stimulus removed: incr likelihood (neg reinforcement), decr (neg punish)
    - Positive reinforcement: company bonus, giving dogs treats
    - Negative reinforcement: if you are polite, you don't have to do the dishes
    - Positive punishment: spanking (giving stimulus as punishment)
    - Negative punishment: parents taking TV away
- Skinner box (behaviourist)
    - Floor is metal (can be electrified), lever to push, food hole
        - Positive reinforcement: push lever to get food
        - Negative reinforcement: push lever to get rid of electric shock
        - Positive punishment: push lever and you get an electric shock
        - Negative punishment: push lever and take away the food
    - Variable schedule of reinforcement: how many times to reach reward
    - Dispose of free will: you don't think, you just do things b/c you have learned to do things
    - Frontal lobe helps disengage: so as to not do things just by habit

PSYCHOLOGY 101: INTRODUCTION TO COGNITIVE AND BEHAVRIOURAL PSYCHOLOGY

Lecture 21: Operant conditioning, observational learning

Schedules of reinforcement

- Interval and ratio: ratio (response phase), how many times it does something, interval (time based), give you a treat every week: less grounded on what the subject does
- Fixed and variable: fixed (reliable), you get food everytime you push the lever, variable (on average, less predictable) every ten times you get a reward
- Ratio schedule is best for reinforcement, slot machine: ratio and variable
- Best type of reinforcement to resist extinction: variable (gambling! Keeps you on your toes)

Features of reinforcers

- Primary reinforcer: people will work very very hard for it b/c its something we crave, ex. Food, sleep, sex
- Secondary reinforce: can be used to get primary reinforcers, ex. Money
- Overjustification effect: work for reward and don't care about the process

Reinforcement and the nucleus accumbens

- Uses dopamine secretion: reinforces, biological basis for addition
- Disfunction in nucleus accumbens makes addiction hard to overcome

Observational learning

- Albert Bandura: social learning theory: learning by seeing what others are doing
- Ubiquitous type of learning: at any age, anyone
- Appropriate models: Bandura Bobo Doll experiment: kids liked guns after seeing aggressive behaviour despite not be attracted to them before (they came up w/ novel ways of being aggressive: using a doll to hit a doll) control group: no modelled behaviour, did not use the objects as weapons
- Cognitive aspects: watch w/out doing it again and know that its not okay
- Bottom line: models are important

Neural basis

- Premotor cortex: contains mirror neurons
    - Also activate when you see someone else do the same thing: learning by observation
    - Brain turns what people do in to what they are doing to understand
    - Problem w/ mirror neurons in autism (speculation)

Lecture 22: Intro to memory, memory stores and processes

The world of memory

- Ability to store and retrieve information over time
- Aspects of memory: 1. Processes/stores 2. Representation

Memory processes

- Encoding: bringing stuff into the mind
    - Process of turning thoughts or feelings into an enduring representation
    - What you pay attention to is what is going to be encoded
- Optimizing encoding
    - Elaborative encoding: the more you work w/ it the better you remember
    - Visual judgement, rhyme judgment, semantic judgment (how it relates to what you know, what it has to do w/ you
    - Levels of processing theory
        - Strategic encoding: ex. build a structure and then fill in the lines

Storage: representation in the mind for a certain amount of time

- Types of memory storage
    - Sensory memory: brief, fleeting visual or auditory sensory store
        - Iconic memory (visual): capturing the visual world
        - Echoic memory (auditory): very brief (huh? Brain catches up)
            - Huge capacity, very very brief (milleseconds)
    - Working memory
        - Moment to moment information in our mind (question in mind when answering)
        - Critical cognitive skill: predicts intelligence, better working mem = incr likelihood of being int
        - Visuospacial sketchpad (visual): the minds eye, closed eyes but you can still imaging things and 'see' things (differs in people…vivid or nothing)
        - Phonological loop (auditory): you can only process so much at a time, thinking things to yourself
        - Limited capacity: 7± 2… items/pieces of information that you can remember at a time
        - Effect of chunking: 561-seventy-eight-eighty 2… 78 is one item instead
    - Retrieval: access memory for utilization

Storage of long tem memories

- Permanent store of knowledge that can be accessed at will
- Where is it stored?: some people think its sorted by what it is… motor memories in motor part of the brain
- Retrieval: accessing knowledge from long-term memory by placing into WM
    - Improving retrieval
        - State dependent retrieval: if you're in the same state when retrieving as you were during encoding, you're more likely to remember
        - Transfer appropriate processing: take work and extend it… think about material in similar way in which you'll be tested in
    - Retrieval failure
        - Tip of the tongue phenomenon: 'you know you know it'
        - The harder you try on something harder it gets… give yourself a break

Memory processes

- Encoding: bring information into mind
- Storage: store it for later use
- Retrieval: access memory for utilization

Long term memory

- Declarative/explicit memory
    - Episodic memory: remember what happens and when it happens
        - Flashbulb memories: clear and vivid; product of something traumatic
            - World trade centre: the closer you lived to it, higher likelihood of flashbulb memories and post-traumatic stress disorder
            - Special brain mechanism involved? Amygdala lit up only in people who were close to the event when recalling the event (amygdala involved w/ emotion)
    - Semantic memory: long term memories about the world that do not accompany the context (you don't remember when it happens…): when did you originally learn that gordon campbell was the premier?
        - Long term memories tend to be semantic… originally episodic memories but then you forget the context and become semantic
- Non-declarative/implicit memory
    - Procedural memory: knowing how to do things (transfer from declarative to procedural: gets easier)
        - Muscle memory: tiger woods, 'get into the rhythm'
    - Priming: saying doctor activates the nurse word (easier to process)

        - Can be dangerous in terms of social psychology (stereotypes)
    - Conditioning (associative learning)

How are long term memories stored?

- Gnostic cell: a single cell represents something (one cell gets activated)
    - If you kill the cell would you forget?
- Distributed representations: info stored depending on type
    - Visual and auditory in diff places

CLASS 24

Memory is constructive

- Pull pieces from memory and put things together, easy to miss- remember
- The power of suggestion: lost in the mall
    - Told them about some true memories and then the made up memory
    - ¼ developed a partial memory of being lost
- DRM paradigm: hits (asked if you heard something before if they say yes and they did) and false alarms, critical lures, phonemic and semantic errors (whatever is relevant and related may cause people to think they heard the word), phonemic (more prevalent in kids…suggest we learn diffly)
- Cognitive psych and the judicial system
    - Eyewitness testimony
        - How accurate is it?, Suggestive questions contaminate memory
        - You can remember things tainted or things that didn't happen at all
        - Misinformation: reject at first and then mis remember it as being true later on
        - The more we tell a story, the more confident in the story we get
        - Feedback effect: they either validate or disproves what you said (confirmation = commitment)
    - How do you improve
        - Reduce suggestibility during questioning (don't ask… did you see?)
        - Minimize false line up identification
            - Control groups, fair composition
            - Careful wording w/ the victims: write down right away, it gets contaminated easily
            - Out-group homogeneity effect: you can tell your own race's differences more easily
        - Educate the jurors
            - Confidence and accuracy: feeling bad for the accused or victim
            - Reliability: memory has high likelihood of getting contaminated
            - Fair weighting of evidence: physical evidence
    - Other influential factors
        - Characteristics of the defendants: attractiveness, similarity, popularity
        - Characteristics of the victims: history, similarity, able to identify w/
        - Judge's instructions: objection! Sustained! Only take this info into account…

CLASS 25

Total recall

- Eidetic memory (photographic memory)
    - Are we born w/ this ability? Environmental?
    - Savants associated w/ autism

CLASS 26: Limbic sys and amnesia, pfc contributions to mem, mem formation and consolidation (Neural Sys for mem)

PSYCHOLOGY 101: INTRODUCTION TO COGNITIVE AND BEHAVRIOURAL PSYCHOLOGY

Synaesthesia

- Seeing/experiencing things diffly than others (ex. numbers are always a certain colour)

Limbic system: processing of memory and emotion

- Allows you to create new declarative memories (episodic mem) and experience emotion
- The amygdala
    - Incr activity to fearful stimuli: learn associations b/w scary and bad things, fear cond't
    - Memory for emotional events correlates w/ degree of amygdala activation (really emotional memories are more vividly remembered) more likely to remember later
    - If the amygdala is damaged: you remember neutral and emotional stimulus equally well (no boost for emotional stimulus), emotionally dead (less variation)
    - Beta blockers: dampen down your fight or flight system: eliminate the emotional memory boost, the amygdala's response is dampened
    - Spazzy people: overactivation of amygdala
- Memory network
    - Medial temporal lobe
    - Damage: mamilary bodies, hippocampus, cingulate gyrus, anterior nucleus (thalamus), fornix

Amnesia: loss of memory (impaired long term memory)

- Retrograde ("soap opera"): you fall and immediately forget everything (temporally graded)
- Anterograde: inability to create new memories after time of event, (possible to lose mems prior to the event)
- Sever thiamine deficiency (acute) → lack of vitamin
    - Patient presentation: memory problems and confusion
    - Cause: chronic thiamine deficiency (alcoholism)
        - Over a month-ish, drink a lot (enough calories) but little food)
        - Women: eating disorders (don't eat enough) bulimia: purging your stomach
        - Depending on severity, symptoms might go away, problems may stick around
    - Location of brain injury : limbic system (mammillary bodies and thalamus is killed, bleeds to death)

Korsakoff's syndrome (chronic)

- Severe anterograde amnesia
- Retrograde amnesia: lose memories from past
- Confabulation: (110degrees outside and they put a jacket on)

Patient HM

- Removal of his medial temporal lobes bilaterally (including hippocampus)
- After effects of the surgery: couldn't create new memories, stopped having seizures
- Profound anterograde amnesia: inability to create new memories (declarative)
- Some retrograde amnesia: memories prior to injury (can rem. old memories but not most recent ones)
- Short term memory, working memory and intelligence intact but no new mems (hippo damaged)
- He can learn some new things but can't remember how he learned it (piano, progress but isn't aware) → not declarative but procedural (muscle memory—not really about muscles but automatic way)

Hippocampus:

- Cells kill themselves when there isn't enough oxygen, no repair/permanent damage

Prefrontal cortex and strategic memory

- Guides memory encoding
- Taking a strategy and using it to help you learn, damage = difficulty figuring out strategies so memory suffers, if you tell them the strategy people w/ damage can still do it…they just can't generate strategies automatically

Prefrontal cortex and controlled retrieval

- Prefrontal lobe retrieves it from LTM, frontal lobe has to work harder to retrieve info about newer signs
- Info stored in temporal lobe

Long term potentiation

- Neurons that fire together wire together, connected neurons (associated w/ each other)
- Enhanced neural processing that results from the strengthening of synaptic connections
- NMDA receptors and glutamate (strengthens connections b/w neurons)

Memory consolidation

- New memories temporarily stored in hippo, then memories are sent elsewhere, in time, hippo doesn't store it anymore (in their own parts)
- Concussion: lose memories: b/c some are still stored in the hippocampus

CLASS 26

Clive Wearing

- Arguably the most sever memory patient in recorded history
- Damage caused by herpes simplex encephalitis (virus)
    - Went back into the brain, causes death instead (Usually goes out (cold sore))
    - Destroyed temporal lobe (happens in 7 days)
    - Profound retrograde amnesia, anterograde amnesia
- Only lives in the present: can't imagine the future b/c he can't hold onto the past or present long enough
- Wife is the only one he recognizes
- Like HM, might be able to learn new procedural knowledge but wouldn't know how or when he learned

CLASS 27

Cognitive changes in ageing

- Brain changes w/ ageing:
    - Reduced blood flow to the brain
    - plaque builds up in arteries
    - Cells less likely to be repaired/replaced
    - Neural transmission slows
    - Brain mass decrs (75+ yrs old)
- Brain can be resilient: exercise, brain has to work harder to do the same thing that its always done, other parts of the brain pick up the slack: cooperation

Dementia

- Acquired persistent impairment of intellectual function w/ a compromise in memory as well as at least two other domains including language, visuospatial skills or executive functions
- (mild cognitive impairment): scale of severity (normal→MCI→dementia)
- Vascular dementia: caused by mini-strokes everywhere
    - Diabetes can lead to this

Alzheimer's disease

- Cognitive deficits
    - Lose most recent memories first (damage to hippocampus, end = no hippo)
    - Memory loss: anterograde/retrograde

    - Language: anomic (trouble naming things), empty, circumlocutory: difficulty communicating
- Behavioural deficits
    - No significant early changes in personality
    - "sundowner syndrome": symptoms are worse at night, bizarre and strange symptoms
    - Lack of awareness and denial, confusion (forgetting where you're going)
    - Psychosis: loss of touch w/ reality → 'awakening": moments of clarity
- No sensory or motor deficits
    - Age of onset: 70's and older (but there is "early onset"), older = more prevalent
    - Typical time course: pass away w/in 7-8 years
    - Multiple health problems… other illness often lead to death
- Biological changes:
    - Cortical atrophy
    - Ridges (sulci), space (gyri) as disease progresses, there are more gyri and the sulci narrow
    - Neurochemical alterations
        - Basal forebrain creates acetylcholine (imp for memory formation), as basal forebrain degenerates, acetylcholine production drops, memory suffers
        - Neurochemical alterations are present before symptoms (detects onset)
    - Pathology of alzheimer's
        - Beta-amyloid plaque interferes w/ neural processing (using toilet but never flushing) → number of it does not correlate w/ severity of alzheimer's
        - Neurofibrillary tangles: tao protein, protein breaks down inside neurons and then neurons will die, related to other kinds of dementia as well → only way to confirm diagnosis (you can't when they're alive)…
- The default network
    - Responsible for when you space out
    - Active when: you think about yourself, envisioning the future, theory of mind, moral decision making
    - Proposed changes to the default network
- Genetic influences
    - Down syndrome and early onset of alzheimer's disease: chromosome 21
- Fighting alzheimer's disease
    - Can't slow it down, can't cure it
    - Drug to incr acetylcholine: Aricept: help them remember a little longer, eventually it stops working
    - Improves life a little: quality of lifeeee communication is better for longer
- Protective factors:
    - Higher education: cognitive reserve, you get alzheimers later and you adjust better once you get it, strategies for learning and remember
    - Complex interactions w/ people, customer service reps have alzheimers later if they get it at all
    - Metal activity: keeping active, sudoku and crosswords
    - Eating fish, healthy died, physical activity

LECTURE 29: Introduction to language

Language: specific to humans

- Generating new ideas, new thoughts (not just communication) (on left side of brain)
    - W/ stroke, women recover language faster than men
- Communication: sending signals
- Some important aspects of communication and language
    - Displacement: talk about things that are not immediately in front of you (in their absence)
    - Arbitrariness: good = bueno even though sounds don't match up, diff languages have diff sounds for each word w/ the same meaning, but we agree that this sound means this idea

  - Productivity: you can generate new things all the time (new sentences, new thoughts that we've never heard of before)
  - Learnability: any child can learn language (window of development: time most responsive to developing an ability → language)

Chimps:

- Nim Chimpsky: teach a chimp language
- Kanzi (monkey) : most language proficient non human animal
  - Can learn that sound goes w/ meaning
  - Sometimes he can generate sentences by pushing buttons
  - Can't generate new sentences that he has not heard before

Phonology

- Fundamental level: study of sounds that help communicate meaning
- Cross language variability: Bantu tribe: click sounds
- Phonetic rules: /ba/ and /pa/ what is next is limited to certain sounds
  - Brain can predict next sound
- Anatomy: how do we make diff sounds?
  - Structure of the mouth (how your teeth are structure, size of tongue, lips)
- Morphology: smallest unit of sound that has meaning
  - Free morphemes: can stand on their own vs Bound: can't stand on their own
    - Ex. Unbreakable (un=bound, break=free, able=bound)
  - Content: mean something vs functional: grammatical morphemes
    - Ex. Functional = and, content = shoes, human
- Semantics: study of literal meaning
  - Potential sources of confusion: (homonyms)
    - Effect of context: helps narrow down possible meanings
- Syntax: study of grammar
  - Rules to how you form sentences
  - Syntaxic rules: noun and then verb
  - Surface (outside) vs deep (meaning) structure
    - You can say the same thing diffly (same deep structure, diff surface structure)
- Pragmatics: study of underlying meaning
  - Indirect sp: oh smoking is soooo good for you
  - Metaphors: the grass is greener on the other side
  - Sarcasm: say one thing mean the other (direct)

Language processing

- Auditory (listening): Parsing (dicing continuous sp into separate words) and filtering
- Visual (reading): Sounding words out vs. "grabbing" whole words (Developmental issues can affect ability)
- Linking percept to meaning
  - Garden path sentences
    - The prime number few → doesn't make sense, re-read
    - Fat people eat accumulates

How do we learn

- Behaviourist account
  - Limitations:
    - Explicit instruction: Picking it up w/out reinforcement or punishment
    - Dynamic generation: put words and nouns in ways they've never heard (semantic thinking)
    - Types of errors (runned): they pick on rules and apply it to all words
- Nativist theory: noam Chomsky

  - Language acquisition device
- Parsing (jenny saffron)
  - Statistical regularities in language
  - Patterns that kids pick up

CLASS 30

Handedness is related to language: right handed = left side dominant, left handed= left, right, or both

Neurosurgery:
- brain has no pain receptors; careful not to damage the "eloquent cortex" (controls language and movement)
- brain pulses so it is difficult to operate on (highly vascular organ)
- stimulate brain to see if it is relevant to movement or language,,, if not, its safe to cut it out (map out brain during surgery to ensure nothing important is being removed)
- Wada test:
  - Test for language lateralization; Anesthetize one hemisphere and test language abilities
  - fMRI now commonly used instead: scan brain while talking and see which side lights up more
  - put one side to sleep and see if they can still talk (help you determine which is side is responsible for language and movement)

Cortical structures for language
- Back of brain : senses and processing: understanding/comprehending language
- Front part: production: movement of lips and tongue
- #1 problem for language is caused by stroke

Broca's aphasia
- 1861—society of anthropology (paris)
- Patient leborgne ("tan"): syphilis attacked his brain
  - Only word he could say was 'tan' but he could understand people just fine
  - Scan: broca's area was damaged, but that's not the area important for sp production, rather the place under it (left insula)
- Doesn't matter what language you speak or if you're deaf (you can't do sign language)
- Patients know that they are having trouble, they know what they want to say but they can't say it
- Symptoms
  - Non-fluent output: can't speak w/ ease, difficulty w/ production
    - Agrammatism: leave out grammar words (leave out the 'ands'… just nouns)
    - Reading and writing can be affected (since you sound out words when you read and write): left frontal lobe damage…right handed (so difficult), writing is laborious
  - Comprehension intact: they can obey commands w/ body language
  - Impaired prosody: unable to speak melodiously, no tone (monotone), can't change stresses
- Back part left frontal lobe damaged
- In some people genetic deformations here may cause stuttering
- Intonation therapy:
  - Right hemisphere spared, musical ability on the right
  - If you teach them to sing what they say they can speak better
- Recovery is possible: could just be a temporary disability

Wernicke's aphasia
- Top part of temporal lobe always on the left side is critical for taking sound & translating it into meaning
- Symptoms

- Don't understand anything: cant read, write, speak (any sounds)
- Writing makes no sense
- Fluent output: They can still talk but it makes no sense (prosody intact)
- Unaware that they make no sense: talk as if everything is okay…they think to understand
- Seem to understand but can't connect it
- Disconnect b/w reality and what you think is happening: disrupted ability to make sense

Global aphasia

- Can't talk, can't understand
- Massive stroke in left hemis, broca's & wernicke's aphasia (damage back frontal & front temporal lobe)

Conduction aphasia

- Connection b/w both areas (arcuate fasciculus)
- Damage: they understand and can talk in a meaningful way -- can't repeat sp

Right hemisphere

- Discourse processing: Getting the 'gist' of things, summarizing
- Sarcasm and pragmatics: Can't understand

CLASS 31

Regular brain and body scanning

- MRI scanners are expensive (w/ radiologist : 1500 an hour): technology + manpower
- Can be used to discriminate: you don't want to ensure people w/ problems (liability)
- Detection…does it change your coverage (USA)
- Pregnant women and babies are not placed in MRIs

Smart drugs

- Aricept: incrs attention and memory formation, ritalin
- Testable effects
- If we have drugs that promote intelligence, should people be taking them? Should we encourage it?
- Incrs gap…rich would buy and poor would suffer (intelligence gap as well)

Brain function and criminal responsibility

- Malfunctions in frontal lobe, frontal lobe less active: sociopath
- Man who was fine, flipped and killed his children and wife
  - Tumour in frontal lobe
  - After: you ask him if its okay to murder.. he says no and when you ask why he can't answer
  - You know right and wrong but it does not guide your behaviour as effectively
- Kids w/ brain injury in frontal lobe (pre natal stroke): don't learn right from wrong: decr emo resp to action
- Animal research
  - Antibiotics and make up is tested on animals
  - Benefits: research, mapping out your occipital lobe
  - PITA under no conditions should you make animals feel pain or harm them

CLASS 31

Consciousness: subjective experience of the mind and of the external world

- Awareness: self awareness

- Reflection: reflect on things we've done, what we're think about and things others have done and what they might be thinking

Properties of consciousness

- Intentionality
  - Attention: direct w/in ourselves (overt: looking at them), covert directing: gaze and mental attention in other directions
  - Capacity? (valence syndrome, then can only pay attention to one thing and have a hard time shifting attention)
  - Duration? Limited
- Unity
  - Resistance to divided resources
  - Differences in productivity: cellphone/driving, studying/watching tv
  - The more you multitask, you are sacrificing the amount of attention you can give to each
- Selectivity
  - Focusing and attenuating (block out others): easy to miss out when you're focusing on one thing
  - Dichotic listening task: diff stuff in each ear, listen to info from one ear only but when you ask him about what he was not supposed to listen to, he does not know (pay attention at the expense of the other)…focus on one… focus on both: gets weird, prone to mistakes
  - Cocktail party effects: process things outside of primary field of attention (they must be related to you… triggered by your name, usually)
  - Paying attention to one thing makes you miss the other even if it is salient
- Transience
  - Our mind likes to shift attention: exaggerated in ADD
  - Evolution: makes sense, too much focus means you're missing out, adaptive; helps us notice new things ad be more aware
  - Strike a balance b/w focusing and engaging in other things

Freud: psychodynamic theory

- 3 pieces below our level of consciousness
  - The id: I want things that are instinctually important to me (eat, sleep, sex ect.)
  - The superego: a conscience: tells you what's good or bad (In conflict w/ id)
  - The ego: mediates b/w id and superego: takes a look at both and tries to find a reasonable compromise b/w the two
- Id vs superego: dissonance and anxiety
- The ego and defence mechanisms
  - Goal: reduce anxiety
  - Coping/defense mechanisms
  - Unconscious: things in our brain that guide who we are and what we do that we're not aware of
- Defense mechanisms
  - Repression: you try to forget things. Dealing w/ it by not dealing w/ it
  - Rationalization: study hard, don't do well and you blame teacher… take something that has happened and change why it happened or what happened (break ups… 'plenty of fish in the sea'), truth gets destroyed generally
  - Reaction formation: behaving inconsistently w/ how we feel, being nice to enemies
  - Projection: take what you're thinking and project it onto the other person (oh you wanted to cheat too!) way to feel better about your actions (infidelity)
  - Regression: using coping mechanisms that were appropriate when they were a child, playing video games, watching loony tunes when you're upset and 34
  - Displacement: nasty feelings that you displace onto someone else, boss yells at your boss and yelling at someone else (not the same as projection)

  - Identification: when you can't beat them, join them, bullied become bullies (can't beat you but can be like you), Oedipus complex; can't have their parent of opposite sex so they find their own
  - Sublimation: take violent sexual tendencies and place them in appropriate contexts (UFC, NFL), create socially acceptable ways to express them (ballet and cirque du soleil)

Visual agnosia and consciousness

- Can't recognize by vision but you can w/ other senses (keys; seeing vs hearing)
- Neglect and consciousness: seeing only one side
- Subconscious: house on fire and not on fire, they will choose the one that's not on fire; you're not aware of it but won't choose the one on fire

Hypnosis

- Idea of putting someone in a suggestable state; more likely to listen to what you say or believe you
- Challenge suggestion: you're legs are a million pounds you can't stand
- Cognitive suggestion: change the way you think, suggest something happened (plant a memory),
- You can suggest things and they remember after
- Whether you believe it or not affects how well it works on you
- Used for smoking: they will go w/ suggestions after
- Post hypnotic amnesia: tell them to forget and they will
- Danger: probability of planting untrue memories: false witness

LECTURE 34:

Sleep

- absolutely all of us sleep, if we do not sleep we will die
- the longest someone has stayed awake is about 4 days: then they slept for 8 hours; but the quality was diff
- most animals and humans operate on a 24 hour cycle
  - this is close to day and night
  - what is important to us is the amount of light!
    - we're awake when there is light outside, and sleep when it is dark
    - you can change this (graveyard shift)
- dolphins and whales are conscious breathers (they have to remember to breathe)
  - when dolphins go to sleep they don't sleep like we do; they make each side of the brain fall asleep at a time (left brain falls asleep, right is good to go, and vice versa)

Sleep pattern:

- brain is currently full of beta waves -> help us gain attention (were awake right now, so we have beta waves
  - drowsy/relaxed is alpha waves
- stage 1 sleep is theta waves
- stage 2 sleep; the person is getting into proper sleep
  - they have K complexes (not clear what these are doing), they have high amplitude
  - also have high activity areas called sleep spindle (these are said to help keep us asleep; it shuts out outer world to some degree; but that doesn't mean you can't be woken up)
  - if you're woken up from stage 2, you won't be as happy as if you were awaken in stage 1, but still better than other stages
  - Genie had these spindles even when she was awake
- stage 3/4 sleep -> DELTA WAVES
  - stage 3 has less than half delta waves
  - stage 4 has more than 50% delta waves
- BATD-> beta alpha theta delta (REM sleep; this signal looks a lot like you're awake but they are asleep!)

The paradox of REM sleep:

- often called paradoxical sleep
- the progression is fast to slow: they have high frequency brain waves, looks like beta waves
- your eyes will dart back and forth (darting eye movements)
- this is odd b/c in most cases your eyes are closed so why would your eyes need to move like tha
- also notice that there is an incrd heart rate, breathing rate will incr, and men will get erections LOL
- critical question: why!?!?!? Why would you get so riled up when you're asleep?

Progressing through a night's sleep:

- same pattern more or less no matter how many hours
- notice that the amount of REM sleep gets longer the longer you are asleep
- you spent most of the night, at least early, in deep sleep
    - but you get less as night goes on; tradeoff is more REM sleep
    - so REM and deep must serve diff purposes
- if you stay awake for a long time, and then finally sleep, you then get more REM sleep

Functions of sleep: evidence from deprivation:

- body regulation-> your body control gets weird, like fever, sweat, and perhaps sleep maintains homeostasis
- attention and performance -> if were sleep deprived it's hard to pay attention
- learning and memory -> you don't learn as well, and sometimes it's just best to take a time out and rest
- emotion regulation -> people get pissy LOL they get grouchy/say things
- short term effects -> sleep deprivation is bad for the reasons we just listed
- long-term effects -> it can snowball

A small selection of sleep disorders:

- sleep talk
- sleep walk (you can grow out of it); most people who sleep walk eat while they sleep
- insomnia: chronic inability to sleep well
    - you might problems going asleep; or staying asleep (could be both)
    - sleep hygiene is important (go to bed at the same time every night; don't have tv and stuff going on; don't have changes or nuances)
- sleep apnea: stop breathing when you are asleep
    - very temporarily though, and then you wake up b/c of lack of oxygen
    - becoming a big problem b/c more and more people are overweight (overweight is more likely to get sleep apnea)
    - not good b/c people keep waking up during sleep
- narcolepsy: fall sleep immediately
    - popularized by deuce bigalo: there is a grain of truth to that movie
    - it can make things dangerous ex. if they are driving, operating machinary
    - these can be genetics and happen in animals too
        - video on goats randomly falling asleep. (fainting goats)
        - their body stiffens randomly (especially when they get surprised)

Dreaming:

- if you are stressed out, it goes into your dream
- sometimes dream are emotionally blank, or very salient -> intense emotion
- when you dream, the timeline is odd sometimes, but its always okay! -> uncritical acceptance
- some people have vivid dream & sometimes you just have difficulty remembering dreams

Why do we dream?

- we don't know (short answer); but were taking a stab at it (long answer)
- freud says we have the unconscious; dreams are the playground of the unconscious
- activation synthesis model: your brain is spontaneously active all the time; so your brain is spontaneously sending signals and your mind is trying to make sense of it
- memory consolidation: REM sleep specifically is when we can consolidate memories; so if you nap after studying you will speed consolidation process (they say stage 3 and 4 is good w/ consolidation process)

Final thoughts on sleep:

- sleep schedules change over our lifetime; this is why we go to sleep earlier when we get older (chemical reason)
- there are notable people differences: some people can do well w/ 5 hours of sleep, some need 8
- literally every psychological disorder is associated w/ sleep issues
    - sleep is normally disturbed, like after brain injury
- if sleep is disturbed when you most need it, it can make recovery difficult, and maybe this is something difficult to work on as we get older

LECTURE 35: decision making and reasoning

What would you do

- Nice meal or nice car? Context is important
- Playing the lottery: probability
- Which college should you go to? : what is the criteria?
- The “trolley dilemma”

Decision making

- Rational choice theory
    - Can compute the value of the various decisions & make the best decision based on the circumstances
        - Expected value
        - If you did something an infinite number of times, the best decision is by considering the probability
        - 20% of winning $500 or 90% of winning $100 (better choice if one time)
        - If you were make the choice several times you would choose option A b/c expected value expected value= P(occurrence)x value
        - Difficulty is capturing the value of options (take unis for example)
        - Value is subjective! Differs per person
- Making good decisions
    - We need full information: often hard and time consuming, not all factors are created equal
    - Using an algorithm: way to solve this problem…take all info, crunch numbers and a choice emerges
    - Function of what you know and what’s important to you… algorithms are never wrong

Heuristics: mental shortcuts that can be wrong

- Availability heuristic
    - Whatever you hear more often is what you think is most important/frequent
    - ‘K’: more words w/ K as a 3rd letter than words that start w/ K but we think there are more that start w/ K b/c it comes most easily to mind
- Representation heuristics
    - 70 engineers and 30 lawyers: description will make us think it’s a lawyer despite the statistics…. Jump from description to decision although
    - Gambler’s fallacy

PSYCHOLOGY 101: INTRODUCTION TO COGNITIVE AND BEHAVRIOURAL PSYCHOLOGY

Factors that influence decision-making

- Framing effects: 75% of good sounds better than 25% chance of death (same thing though!)
- Sunk Cost fallacy
    - Can't control past but you can control the future…we get caught up (invested) and finish a bad movie
    - Opera and you're sick: you shouldn't go cause it's a sunk cost… its better to heal

Problem solving

- Goal (where you want to be), current state (where you are), difference, reduce part 3
- Ill defined problem: if they're not concrete, immeasurable or tangible

Strategy

- Method and means-end
    - Can one situation apply to another? (castle and bridge → cancer radiation) you don't want to crush the bridge so you build several and all go in to attack the same thing…. Cancer; direct would kill healthy cells so you have several lasers and aim for the same thing
    - Analogical reasoning
    - Insight: aha! Moment

Reasoning

- Deductive: taking general info and making it specific to one
    - All apples are fruit, All fruit grows on trees →All apples grown on trees
    - Inductive: specific to general (leads to stereotypes)
        - Generalizations: Take one example and apply to everyone

LECTURE 36:

'Hot' vs 'cool' cognition

- Hot: emotion driven decision making
- Cool: suing cognitive faculties to make decisions, 'divorced' from emotions
- What do you use when you make moral judgments?
    - Emotion centre (amygdala) are very active, cognitive are less active

Helping behaviour

- Altruism: helping someone w/out receiving anything back, doing it for the sake of 'it's the right thing to do', likelihood of helping isn't random; we're more likely to help family and people we're close to, further from core circle= less likely
- Reciprocal altruism: doing something altruistic and some else does something altruistic back to you
- Cooperation: working together for a common goal
    - Prisoner's dilemma: do you rat out the other? If both remain quiet its best w/ 2 years, if one betrays; then one gets 1 year and the other gets 5 years in jail, if both speak out, they each get three years (best for group if both stay quiet, best for indie to snitch)
    - Ultimatum game: divider and decider: emotional response of injustice drives you to make an illogical decision; hot takes over cool

Group behaviour

- Group: 2+ people w/ common cause
- You treat people in group better than people outside of your group
- Associated w/ prejudice and discrimination (my group is better…)

Behaviour w/in a group

- Deindividuation: mob mentality; you feel powerful and do stupid things

- Social loafing: bigger group = less each person does, group of 5 – 1 person does nothing
- Diffusion of responsibility: 'other people will take care of it', tendency to think that other people are doing things that we should be doing, less likely to help when there are other people around
- Group polarization: people strengthen your confidence and thinking

Norm

- Norm: ways people should behave based on their position
- Normative influence:
    - Rely on it in a new situation/context
    - Norm of reciprocity; tit for tat
    - Door in the face technique: someone comes up to your door and pitches something, you say no, they pitch for something smaller and you say yes
    - Large request → smaller request; they compromise and you feel obliged to compromise too

Conformity; doing what others do

- Elevator pranks; person follows three other people (turning around in the elevator)
- Solomon Asch: more likely to deviate when you have a 'partner', conformity drops 2/3 when anonymous

Consistency

- Desire to behave w/ similar principles across situations
- Cognitive dissonance; when you don't do as you think (conflict)
    - Correction; re-evaluate the way that you think
    - Foot-in the door technique; small request → larger request (sampling at Costco, test drives)