INTRO TO PSY-FOUNDATIONS_1101

FALL 2019

DATE	TOPIC	ASSIGNED READING
Sept. 4	Introduction and overview of course	Syllabus, Brightspace site, Time Management (pp. xlvi-liii)
Sept. 9	History of Psychology	Prologue
Sept. 11	Thinking critically	Chapter 1 (pp. 1-17, 19-49)
Sept. 16	Thinking critically	Chapter 1 (pp. 1-17, 19-49)
Sept. 18	The biology of the mind (neuronal and hormonal systems)	Chapter 2 (pp. 41-65)
Sept. 23	**TEST**	**BRING YOUR STUDENT CARD**
Sept. 25	The biology of the mind (Brain)	Chapter 2 (pp. 66-89)
Sept. 30	The biology of the mind (Brain)	Chapter 2 (pp. 66-89)
Oct. 2	Sensation and perception	Chapter 6 (pp. 229-277)
Oct. 7	Sensation and perception	Chapter 6 (pp. 229-277)
Oct. 9	Review activities	All chapters listed above
Oct. 14	Reading week	Catch up on your readings and study for the midterm
Oct. 16	Reading week	Catch up on your readings and study for the midterm
Oct. 21	**MIDTERM 1**	**All material covered so far** **BRING YOUR STUDENT CARD**
Oct. 23	Consciousness and the two-track mind	Chapter 3 (pp. 91-131)
Oct. 28	Consciousness and the two-track mind	Chapter 3 (pp. 91-131)
Oct. 30	Learning	Chapter 7 (pp. 279-315)
Nov. 4	Learning	Chapter 7 (pp. 279-315)
Nov. 6	Memory	Chapter 8 (pp. 317-353)
Nov. 11	Memory	Chapter 8 (pp. 317-353)
Nov. 13	What drives us	Chapter 11 (pp. 419-457)
Nov. 18	**MIDTERM 2**	**All material covered since Midterm 1** **BRING YOUR STUDENT CARD**
Nov. 20	What drives us	Chapter 11 (pp. 419-457)
Nov. 25	Emotions, stress, and health	Chapter 12 (pp. 459-487)
Nov. 27	Emotions, stress, and health	Chapter 12 (pp. 459-457)
Dec. 2	Catch-up/Review class	Catch up on your reading!

Sept 9, 2019

Lecture 2

Two Main Branches in Psychology

- **Clinical psychology** (helps with behaviour problems)
- **Experimental psychology** (research behaviour and the nervous system)

Psychology hasn't always been a science; originally, it was more a philosophical discussion than a controlled scientific field that laid out testable hypotheses.

Concepts and approaches to psychology (DPSENB)

- Dualism
  - Dualism (1600s): humans consist of material body and immaterial mind (soul controlled most abilities)
  - Rene Descartes: body drives most behaviours; the soul controls only thought
  - Mind and body are separate - there are threads in the body that control movement
    - Now we call these nerves
  - Some behaviours happen without thought
    - Now we call these reflexes
  - Hobbes (1600s) took Descrate's view one step further and said that even the functions of the brain could be understood through physical processes
  - Was a philosophy, not a science (argument > explaining mechanism)
- Phrenology
  - German doctor, Franz Gall, 1800s
  - Belief that each part of the brain controls a particular part of the personality
  - Can detect someone's relative ability and weaknesses by measuring the bumps on their head
- Structuralism
  - Attempt to break our conscious experience down into basic elements to understand the structure of the mind
  - Used introspection to attempt to reveal structure of human mind
  - Wundt and Tichener (1800s, 1900s)
- Empiricism
  - The mind is a blank slate
  - Experience is everything
- Nativism
  - Some knowledge of rules of operation are inborn in human
    - A priori knowledge (theoretical deduction)
    - A posteriori knowledge (observations/experiences → deduction)
    - Evidence for a posteriori effects on a priori ability
      - Our visual system is prepared to organize visual input, but this is influenced by experience
    - People with different perceptual experiences show differing effects
- Behaviorism
  - Focused on observable behaviour

- Behaviours develop through their consequences
  - +ive consequences: behaviour increases
  - -ive consequences: behaviour decreases
  - Absolutely no focus on the mental processes (A.K.A anti-structuralism)

Cognitive Revolution

- Behaviourism abandoned because too strictly excluded mental processes
- Cognitive revolution brought psychology to a stage where it was acceptable to study mental processes in a scientifically controlled manner

- **Psychology:** scientific study of behaviour and mental processes

3 main levels of psychological analysis (BS-CP)

- Biology
  - Genes, evolution, hormones physiological structure of body/brain
- Socio-cultural influences
  - Other people, expectations of culture, family, media
- Psychology
  - Learning, emotions, perceptions of reality

Many current psychology fields

- Evolutionary
  - Natural selection, animal behaviour, evolution
- Neuroscience
  - Brain, nervous system, emotions, learning
- Behavioral
  - Learning responses to stimuli
- Cognitive
  - Encoding, processing, retrieving info
- Sociocultural (personality, social)
  - Influences of social and cultural settings
- Developmental
  - Age-related changes in behavior, understanding, emotions
- Clinical
  - Treating people with a variety of problems

Think critically

- Today's psychology is a science
- Scientists form hypotheses based in logical theory and evidence
- Scientists demand rigorous evidence to support hypotheses before they believe them
- Science revolves around questions
  - Systematic asking and answering of questions
    - Logical
    - Evidence-based

- Goals of psychological science: to gain new insights in our understanding of human behaviour/mind/thoughts
- Importance of skepticism and curiosity

Conflicting hypotheses

- Evidence is very important
- Often our intuitions are correct
    - **Hindsight Bias:** understanding of a situation or event only after its occurred or developed
    - They can often be wrong too

Methods of knowledge acquisition (TIARES)

- Tenacity: "it's always been that way"
- Intuition: "it feels true"
- Authority: "the boss says its true"
- Rationalism: "it makes sense logically"
- Empiricism "I observed it to be true"
- Science: a combination of rationalism and empiricism

Science

- Scientists are *skeptical*, not *cynical*
- Curiously open to ideas
- Base beliefs on *empirical data*, not unsupported claims

Sept 11, 2019

Lecture 3: Critical Thinking Research Methods 1

- Focus on the scientific method and research designs
    - **Scientific Method:** system that guides scientists to collect and analyze obtained data

Thinking Critically

- Psychology = science
- Science revolved around questions
    - Systematic asking and answering of questions
- Psychological science goal: gain new insights in understanding human behaviour/mind/thoughts

Methods of knowledge acquisition

- Tenacity: "it's always been that way"
- Intuition: "it feels true"

- Authority: “the boss says its true”
- Rationalism: “it makes sense logically”
- Empiricism “I observed it to be true”
- Science: a combination of rationalism and empiricism

7 Steps of the scientific method (TH-VRCAFR)

1. Formulate testable theory
2. Formulate testable hypothesis
    a. Operationally define variables
3. Select research method
4. Data collection
5. Data analysis
6. Report findings
7. Revise theory (account for findings)

Step 1: Formulate a theory

- **Theory:** testable set of ideas that explain the phenomenon of interest
- Example:
    - You've noticed that a few of your friends who are good at math played music as kids
    - Theory: training in music facilitates the acquisition of mathematical skills

Step 2: Formulate a hypothesis:

- **Hypothesis:** specific prediction about how/why variables in question are associated with one another
- Examples
    - Kids who learn and play music well through intensive musical training will be more likely to show good mathematical skills
    - The same patterns of brain activity will appear when a person is engaged in either a musical task or a mathematical task
    - People who get good at music are driven to practice; this tendency helps them do well at math too
- Hypothesis: Kids who do well through extensive musical training will be more likely to show good math skills
    - How do we determine
        - Quality of musical performance
        - Amount of musical training
        - Quality of math skills
- Determine **operational definition** (explanation of how we’re defining our variables for our study
    - Speed and accuracy of playing
    - Time taken to identify musical components
    - Speed and accuracy of completing math problems
    - Math grades

- **Operational definition in hypothesis:** 3 years of musical training on a violin between age 5 and 8 will result in higher math grades in 3rd grade

Step 3: Select a research method

- Experiments require dependent, independent, and controlled variables
    - Make sure everything is the same/controlled except the independent variable which will directly influence the dependent variable ONLY (make the two groups equivalent)

Step 4: Data collection

- Collect data in the most controlled way possible

Step 5: Data analysis

- This may lead back to more data collection or a revision of the hypothesis

Step 6: Report findings

- Publicly presenting work allows for other experts to give peer evaluation
- Replication

Step 7: Revise Theory

- Back and forth process

Science vs. Pseudoscience

- Scientific work = must withstand rigorous tests of science
- Pseudoscientific claims seen in forms of
    - Case studies
    - Personal reports
    - 'Scientists'
- Not necessarily 'bad' forms of info, but trustworthy science = demonstration and replication

Designs in psychological research

- Different designs have different uses and different levels of constraint (limits and controls)
    - Case study (description) (lowest constraint)
    - Naturalistic observation (description)
    - Correlational research (relationship)
    - Experimental research (cause explanation) (highest constraint)

Case study

- Case studies examine one individual in great detail
- Savant: Leslie Lemke
- Severe MR, blind, limited speech
- No musical training BUT able to reproduce an entire concerto after a single hearing
- Sing in several languages

Case study: Memory and the brain

- Henry Molaison (H.M.) (link in lecture slides)
- Brain surgery in 1950's to counteract epilepsy
- Could form no new long-term memories
- Studied throughout his life - now his brain is being studied

Pros	**Cons**
Good for giving ideas for future research	Usually one descriptive, not explanatory
Extreme cases that would be unethical to create	Only studying one person - may not be representative of the population - Anecdotal evidence
Often studied in natural conditions	Hard to avoid influencing behaviour of participants
	Can be time consuming

Using a sample

- We want to draw conclusions about how a whole population (everyone we're interested in) would behave, but it's impractical to test everyone
- Instead we draw a representative sample of people, test them, and generalize to the population
- How do we know its representative?
    - Random selection: everyone in the population has an equal chance of being selected

Naturalistic observation

- Classroom observation
- Roger Hanlon (link in lecture slides): octopus camouflage
- Flexible, pen questions since the work was ground-breaking
- But observation is systematic: carefully recorded and organized
- Can be observation from afar or can involve participation of observer

Pros	Cons
Good for giving ideas for future research, investigating new areas	Usually one descriptive, not explanatory (people who live in cold climates are more likely to die of heart disease)
See people behave as they typically would	Sample not randomly selected (may not be representative of the population
Can be useful to verify (possibly artificial) lab results	Hard to avoid influencing participants
	Time consuming
	Little control

Sept 16, 2019

Psychology Lecture 4: Methods in Personality Psychology II

Correlational research

- Looking for the relationship between variables
- Often less control than experimental designs, though often possible when an experiment impossible
- No implication of causality!
    - Possibility of third factors

Spanking → lower IQ

Scatterplots (page 26)

Experimental designs

- Does my training program work?
- Does the medication help?
- Random assignment to groups and control of other variable allows inference of causality

Key concepts in an experiment

- **Independent variable:** variable that is manipulated
- **Dependent variable**: variable that is measured
- **Experimental group:** group of participants that receive the treatment component of the manipulated variable

- **Control group:** group of participants that is the same as the experimental group in every way except that they don't receive treatment component of the manipulated variable

Experiment example

Hypothesis: listening to music while studying improves students' test performance

Experimental group	**Control group**
Study list of 20 words for 2 minutes	Study list of 20 words for 2 minutes
Wear headphones to study	Wear headphones to study
Listen to music	Listen to white noise
After 5 min, report words from list	After 5 min, report words from list

Key concepts in an experiment

- Everything about the groups is identical except the treatment (independent variable)
- Any differences on the dependent variable must be due to the difference in treatment
- Test whether changes to the independent variable cause differences in the dependent variable

Ensuring similar groups?

- Random assignment
- Matching
- Sham control

What happens if 2 groups are not exactly alike?

- **Extraneous Variable:** any variable other than independent variable that can have an effect on the dependent variable
- **Internal validity:** how certain we are that changes in the independent variable cause changes in the dependent variable

Pros	**Cons**
- Can establish casual relationship between variables	- Artificial
	- Not always ethical

Basic vs. applied research

- **Basic research:** for knowledge
- **Applied research:** helping people
- Basic research typically less funded
- Applied research often builds on basic research
    - I.e: Dr. Phil Gander: tinnitus
- Basic research can also lead to theories that have applications for applied research

Read Describing Data (textbook) and make sure you understand these concepts

Sept 18, 2019

Lecture 5: Brain

The biology of the mind

- The brain: basics
- Neurons and the action potential

The nervous system (SI-I-MO-R)

- Brain and spinal cord
- Nerves to and from the rest of the body
- Sensory input → integration → motor output → sensory input (continued)

The brain: Fun facts

- Weight (31400-1400-78-10-2)
    - Adult: 3 lbs (1400 g)
    - Newborn: less than 1 lb (400 g)
    - About 78% water, 10% fats
    - Makes up about 2% of our total body weight
- Size (C14-17-9-2.5F2-20%-L186MNTR)
    - 17 cm long x 14 cm wide x 9 cm tall
    - **Cerebral cortex:** 'advanced' brain
    - If stretched out, the cerebral cortex would be about 2.5 square feet
- Uses about 20% of your energy
- Left hemisphere has 186 million more neurons than right hemisphere

Neurons (100BN-NR)

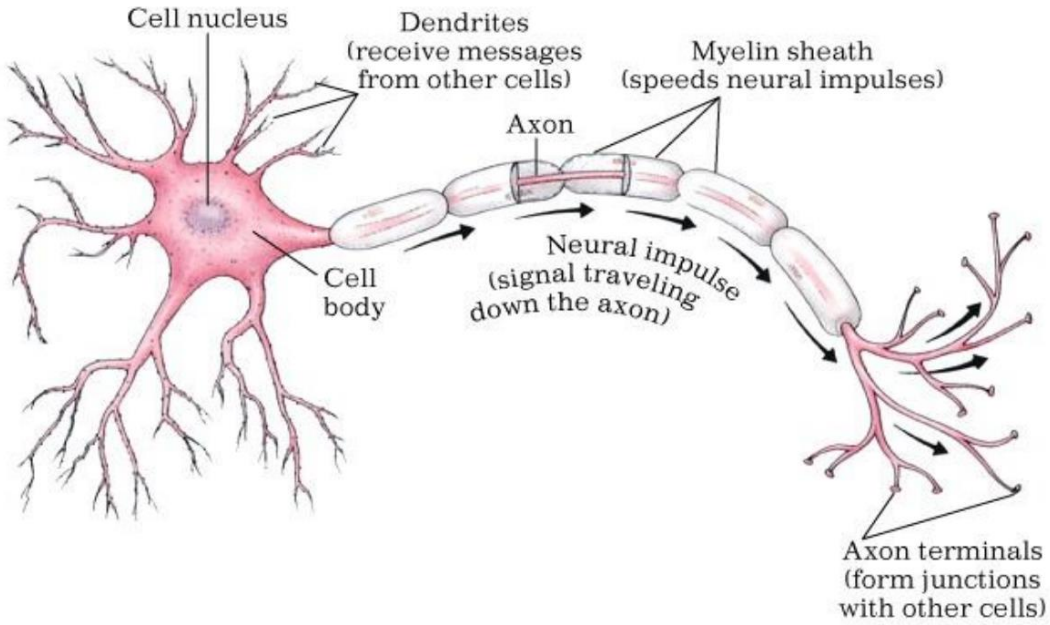
- Like the rest of body, brain made of cells
- Neurons: specialized cells in nervous system
- Human brain has 100 billion neurons
- Most neurons don't regenerate
- Communication cells
- Transmit action potentials (nerve impulses) from body parts
- Many shapes and sizes

Types of cells in nervous system

- Neurons

    - Sensory neurons: info from brain → body
    - Motor neurons: commands from brain → body
    - Interneurons (most prevalent): process info between neurons
- Glial cells: provide structural support, nourishment, and insulation for neurons

All neurons have same basic structure



- Communication happens through electrical excitation: a neuron gets excited and transmits its electrical charge from one end to the other, sending it on to another neuron

Myelin sheath

- Fatty tissue coating axon, speeding transmission
- Allows nerve impulses to jump node → node (quickly)
- Includes myelinated sheath wrapped around axon and Nodes of Ranvier (jump points)

Multiple sclerosis

- Autoimmune: immune system attacks proteins in myelin
- Myelin becomes inflamed, swollen, detached, gradually destroyed
- Nerve impulses short-circuit

Action potential (sensory n input or adjacent n, chemical exchange → electrical charge travels)

- Initiated by input from senses (sensory neuron) or activity of adjacent neuron
- An electrical charge that travels down the axon
    - Driven by chemical exchange

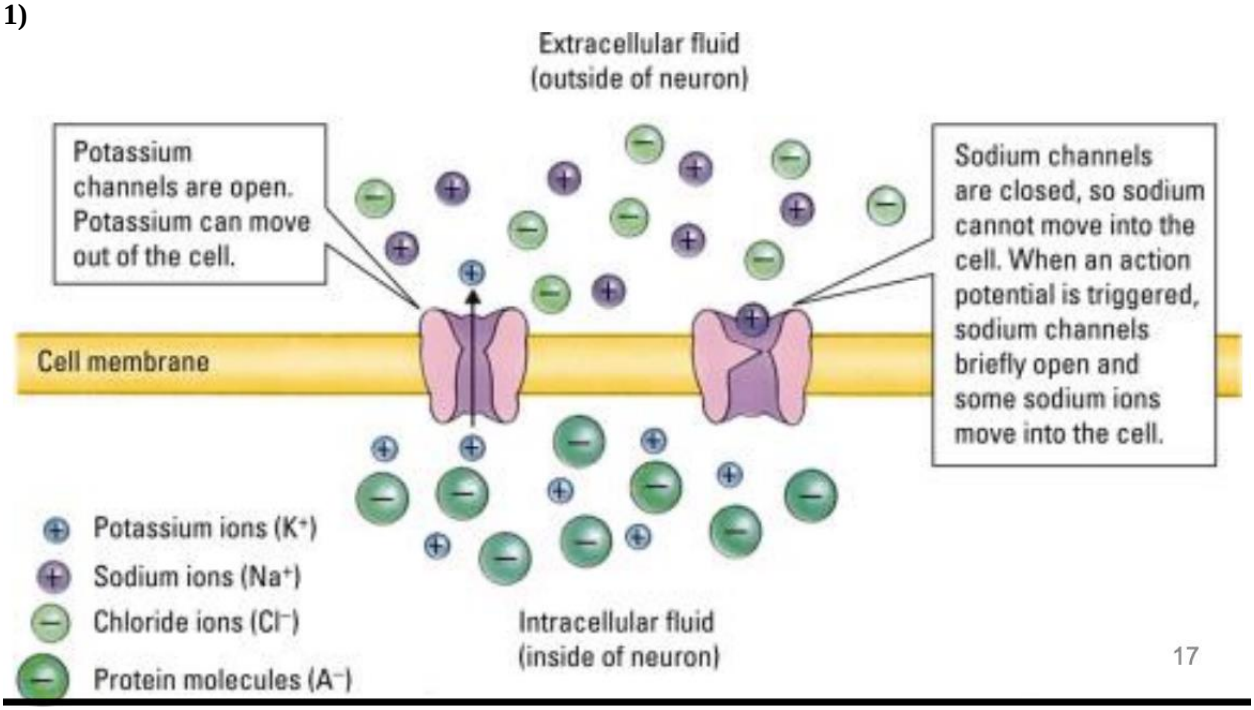
The resting potential (RP: inside (negative) K+ & protein, outside (positive) Na+ & Cl-; pump out 3Na+ in 2K+; extracellular 0mV intracellular -70mV)

- When neuron not active
- Inside axon: negative charge (excess of negatively charged ions)
- Outside axon: positive charge (excess of positively charged ions)
    - **Resting potential:** difference in charge across membrane

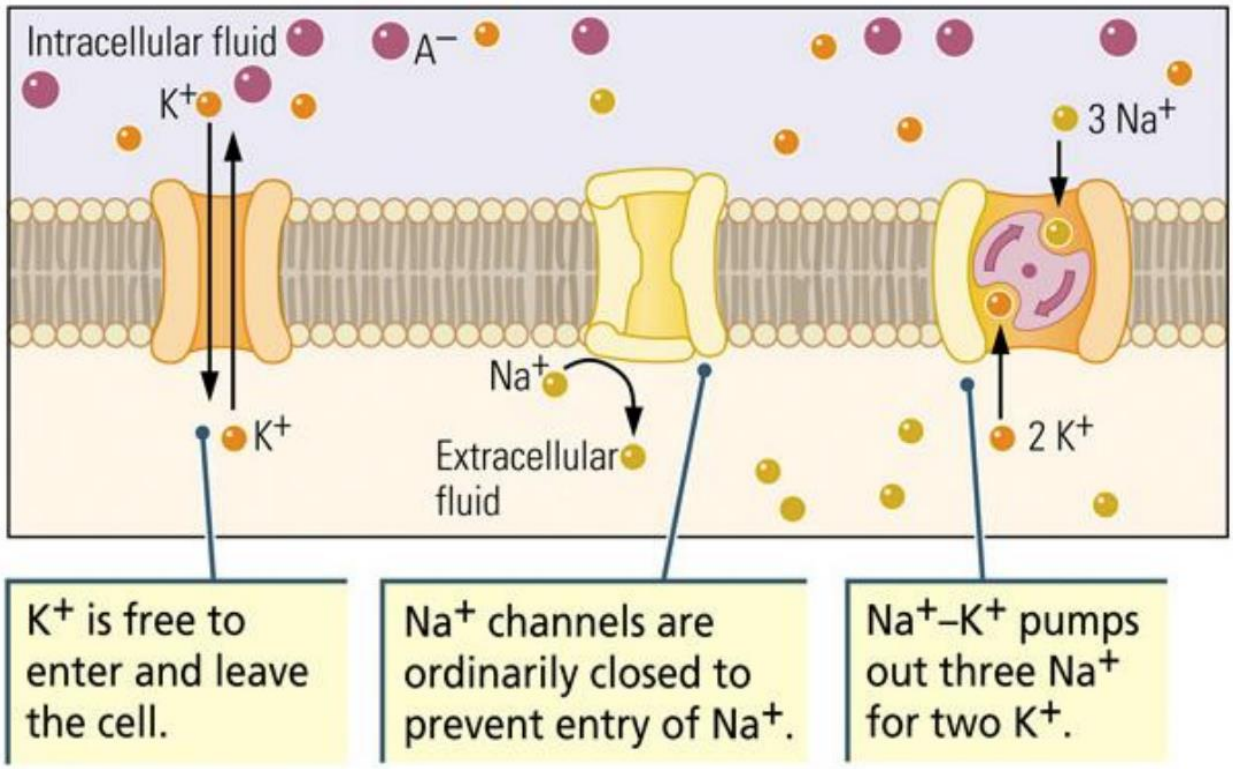
Cell membrane: resting

- Selectively permeable: specialized structures keep negative ions out

1)



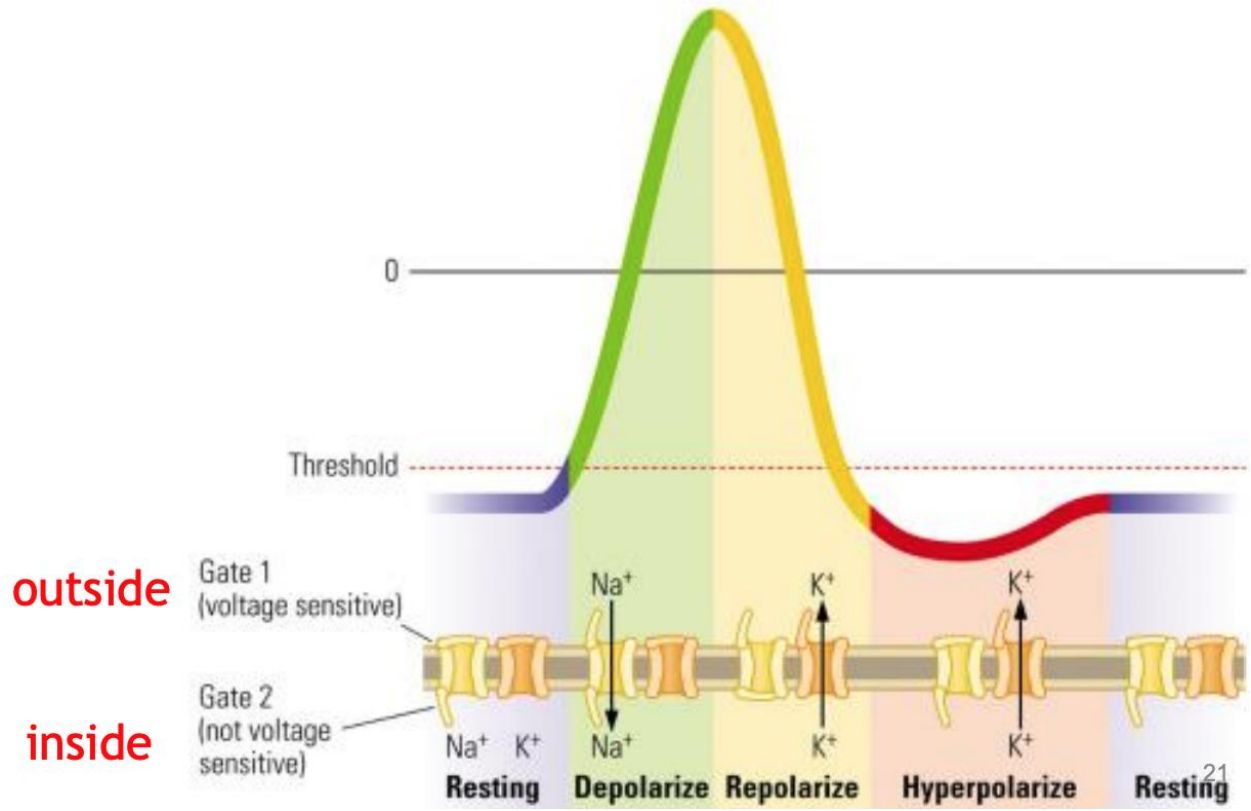
2)



- We use electrodes to measure voltage on outer and inner surface of axon
- Extracellular side has a charge of 0 mV
- Intracellular side has a charge of -70 mV

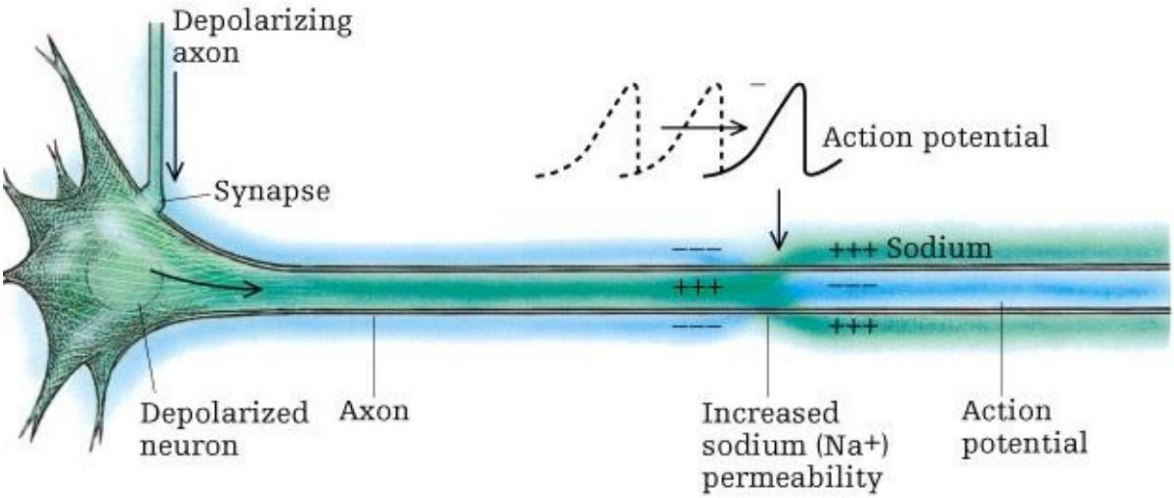
Cell membrane: Firing (action potential) (RDRH)

- Refractory period: sodium pumped back out of axon cells, then ready to fire again after a period of time



* LOOK AT OLD BIO NOTES *

Propagation



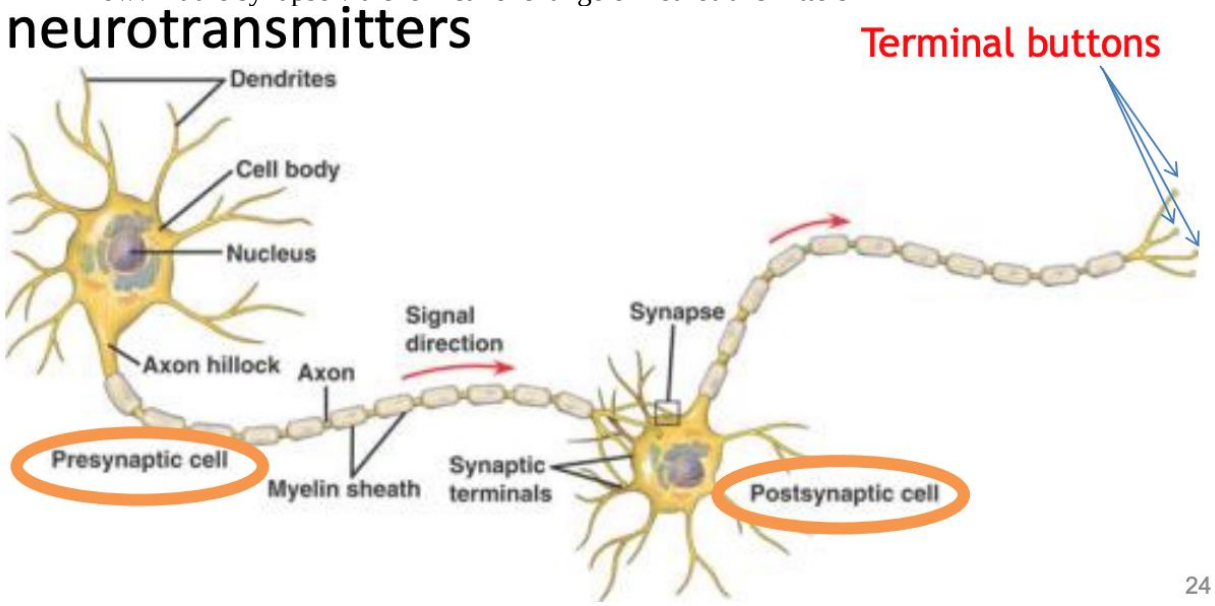
All-or-none response

- Each neuron receives messages from many other neurons
    - Excitatory or inhibitory

- If excitatory > inhibitory: FIRE
- If excitatory < inhibitory: DO NOT FIRE
- Intensity of sensation/response is coded by number of neurons firing, not by size of response each neuron gives
    - As long as it's activated enough to depolarize, it will give the same response each time (like a switch)

Neural communication

- Neurons communicate with one another
- How? At the synapse via chemical exchange of neurotransmitters

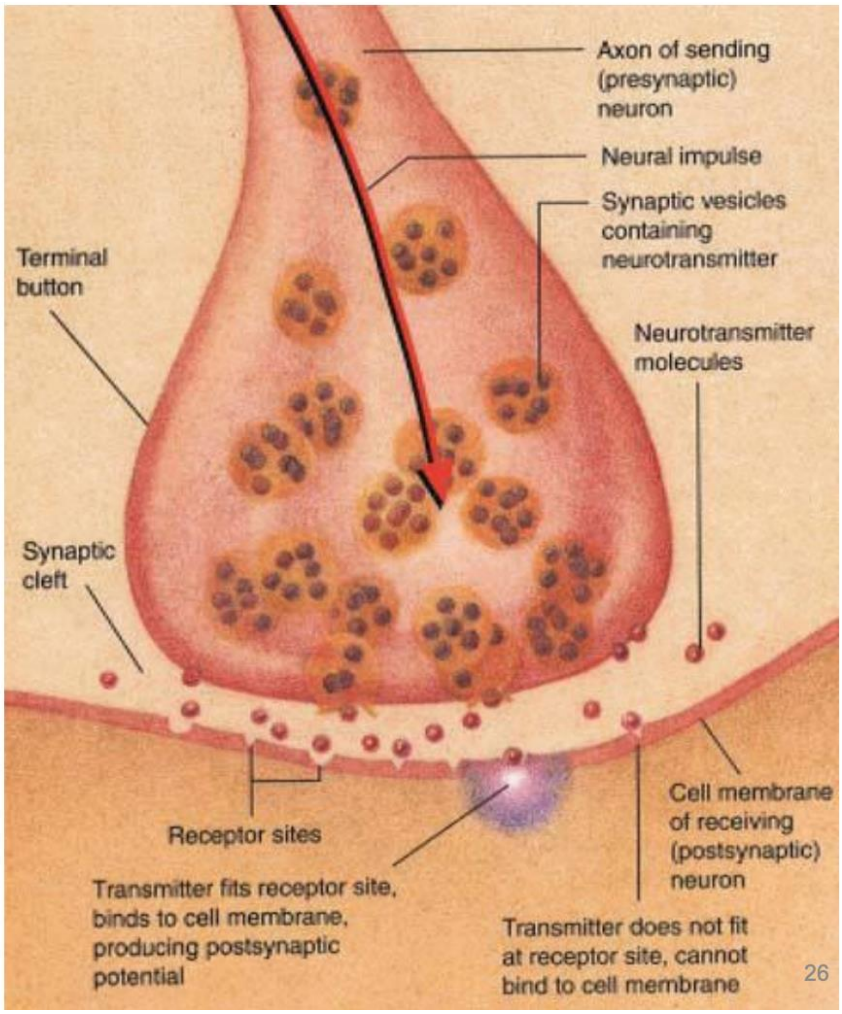


Neurotransmitters

- Chemical messengers
- Each has a distinctive shape, binds to specific receptors
- Different pathways in the brain are specialized to use different neurotransmitters
    - Different neurotransmitters are thus associated with different functions

Presynaptic neuron (axon terminal button)

Postsynaptic neuron (dendrite)



What happens to leftover neurotransmitter? (broken down + reabsorbed pre-cleft)

- Broken down by enzymes
- Absorbed back into the presynaptic neuron

Neurotransmitter	Function	Examples of effects
Acetylcholine (ACh) (MA-ML)	Muscle action, memory, learning	- **Alzheimer's:** deteriorating ACh prod. n's - Anaesthetics inhibit ACh prod + movement
Dopamine (DA) (MLAEP)	Movement, learning, attention, emotion, pleasure	- Too much: schizophrenia (delusional) - Too little: Parkinson's (motor skills down) - Low → addiction (activates pleasure centres)

Serotonin (5HT) (MHSA)	Mood, hunger, sleep, arousal	- Low: depression, anxiety - Low: increased risk of SIDS
Norepinephrine	Alertness, arousal	- Low: depressed mood
GABA	Major inhibitory NT	- Low: seizures, tremors, insomnia
Glutamate	Major excitatory NT; memory	- High: migraines, seizures (avoid MSG in food)

Do research on Selective serotonin reuptake inhibitors (SSRIs)

5HT and SIDS

- Unexplained death of an infant in first year of life
- Post-mortem exam:
  - Serotonin levels 26% lower in SIDS tissue than in control tissue
- Stomach sleeping increases risk of SIDS: low oxygen, high carbon dioxide
- Combination of factors:
  - Low 5HT (underlying vulnerability)
  - 1st year (critical period for breathing development)
  - Sleeping face-down (external stressor)
- Normal infants breathing face-down may not get enough oxygen, but would respond by turning head or waking. Infants with low levels of 5HT (intrinsic abnormality) **DON'T RESPOND**.

Neurotransmitters

- **Excitatory:** depolarize postsynaptic cell
- **Inhibitory:** hyperpolarize postsynaptic cell
- Each neuron produces only one type of neurotransmitter
- Any one neuron can have synapses from excitatory and inhibitory neurons

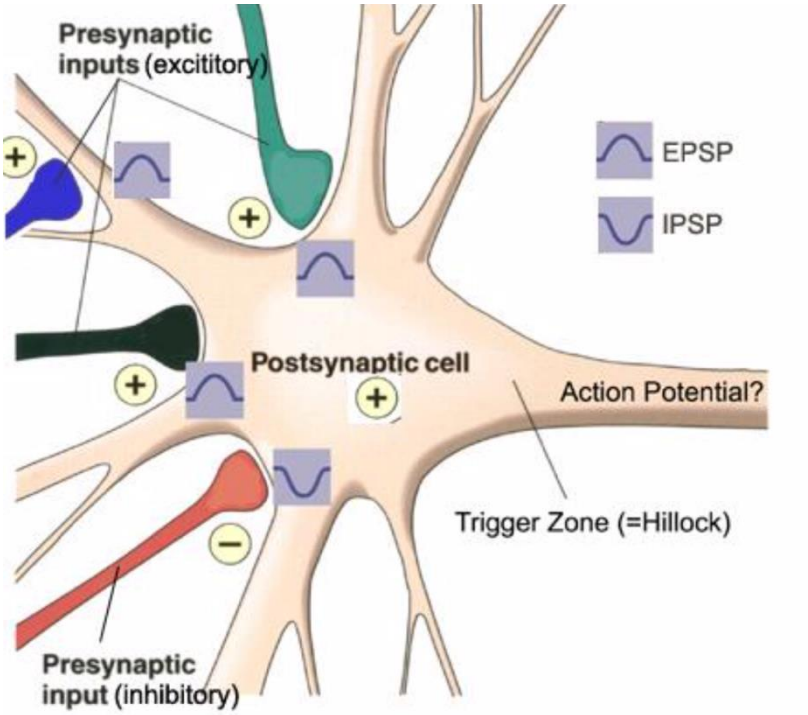
MAINLY LECTURE (80% from lectures alone)

Sept 25 & 30, 2019

Lectures 6 & 7: Biology of the Mind

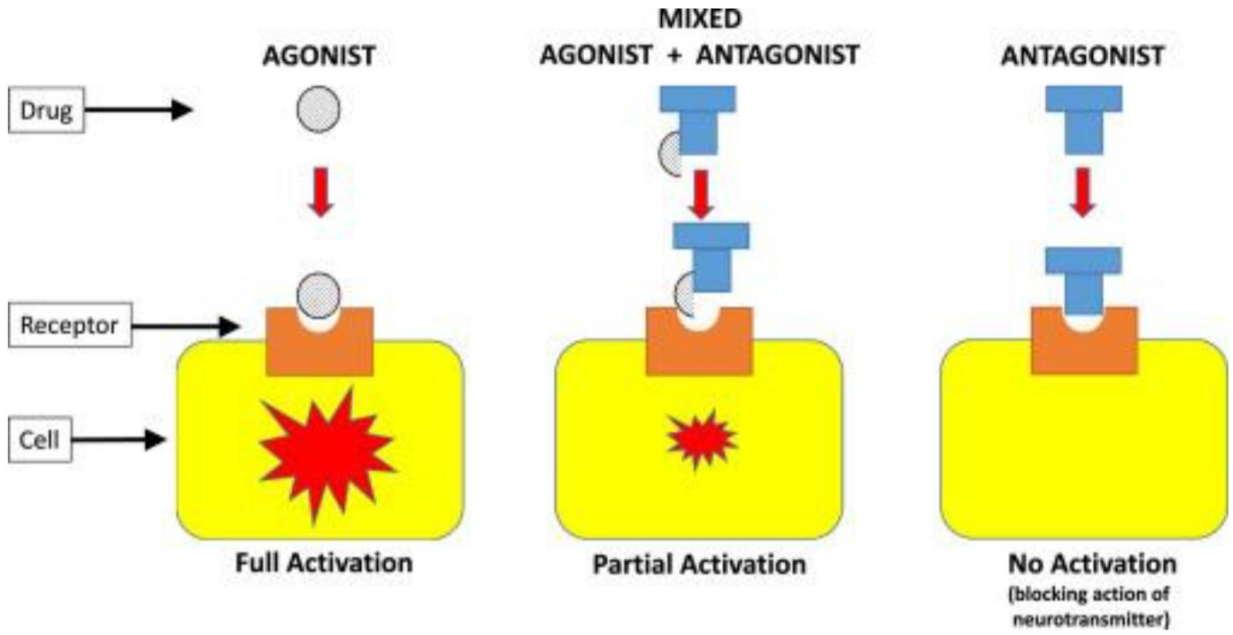
Review: Neurotransmitters

- Excitatory: depolarize postsynaptic cell
- Inhibitory: hyperpolarize postsynaptic cell



Drugs and Neurotransmitters

- Agonists: enhance action of NT
  - Bind to receptors and stimulate them (mimics)
    - Drugs for Parkinson's are dopamine agonists
    - Heroin binds to opioid receptors
  - Prevent reuptake of NT so synapse is flooded
    - Cocaine binds to dopamine reuptake molecules → blocks them
    - SSRIs
- Antagonists: impede action of NT
  - Binds to receptors and blocks them
    - Schizophrenia drugs block dopamine receptors
  - Block transmitter at muscle receptor
    - Curare: blocks ACh receptors on muscles (binds but does not activate), leading to paralysis and death (respiratory muscles)
    - Surgery: muscle relaxants

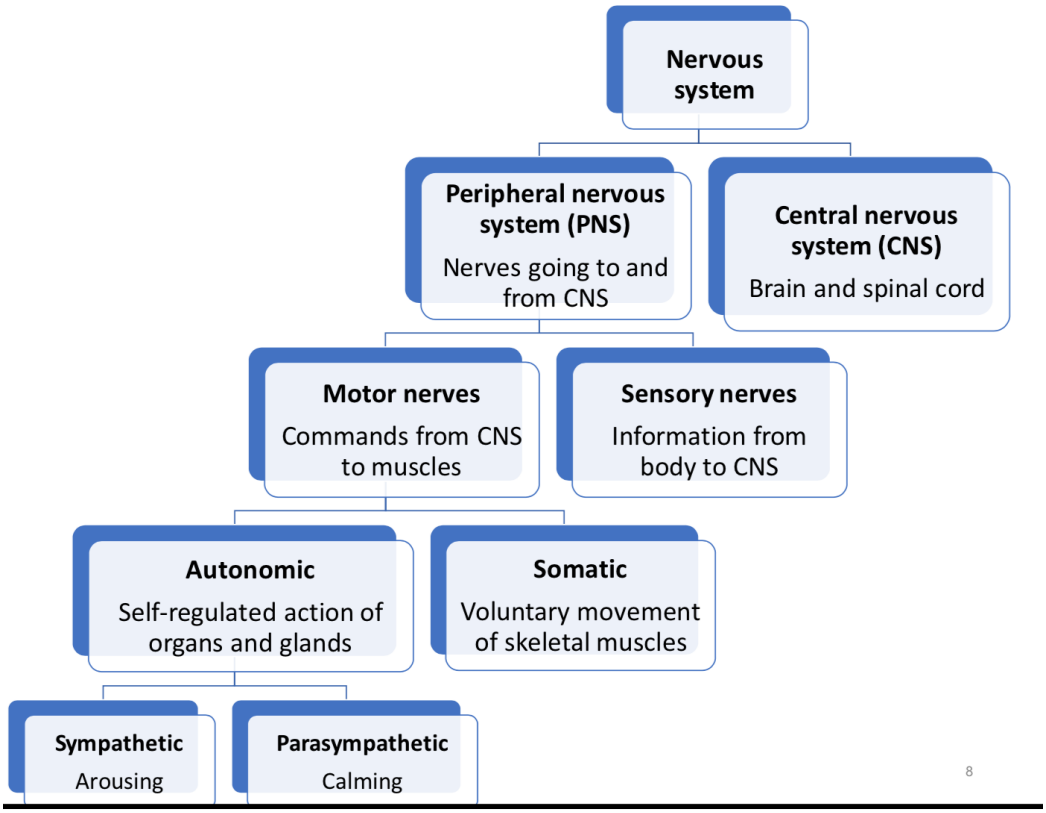


Example: Serotonin (5HT)

- Remaining 5HT
  - Destroyed by enzymes in the cleft
    - MAO
    - COMT
  - Or taken up by specialized transporters on the presynaptic cell (reuptake)
    - In the presynaptic cell, MAO and COMT destroy the absorbed serotonin molecules

Treating depression

- SSRIs (Selective Serotonin Reuptake Inhibitors)
  - Increase level of 5HT in brain by preventing reuptake
  - Examples: Prozac, Celexa, Cipralex, Zoloft
- MAOIs (Monoamine Oxidase Inhibitors)
  - Increase level of 5HT in brain by inhibiting activity of MAO so that 5HT can't be broken down
  - Examples: Nardil, Emsam, Parnate



Peripheral Nervous System (PNS)

- **Sensory nerves:** bundles of axons that transmit impulses from special receptors to CNS
- **Motor nerves:** bundles of axons that send impulses from CNS to organs and muscles
    - **Somatic:** send impulses to voluntary muscles
        - Writing, turning a page
    - **Autonomic:** send impulses to involuntary muscles
        - Heart, blood pressure, intestines

Central Nervous System (CNS)

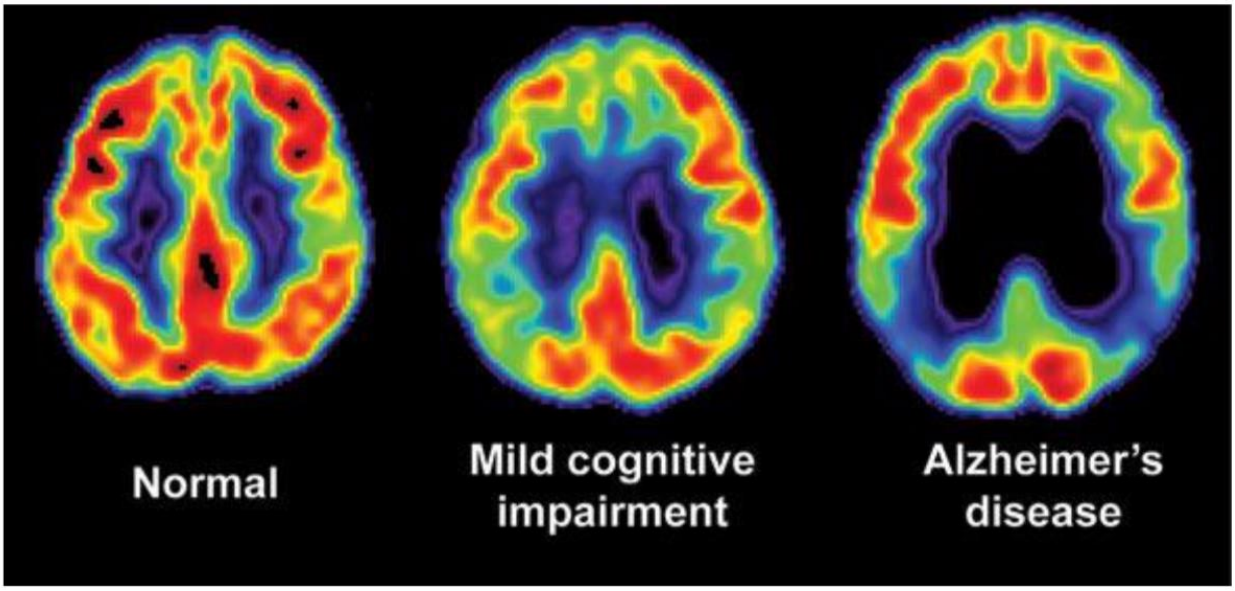
- Some impulses don't go to the brain (reflexes)
    - Touch something hot with finger
        - Sensory nerve sends heat info to spinal cord
        - Interneurons connect sensory neuron to motor neuron
        - Motor neuron send command to move finger
    - You might get a conscious sensation of pain, but it could be after hand is moved away

Arousal Reflex

- Brain is connected to body via spinal cord
- Damage to spinal cord creates 'disconnect'
- But reflexes not mediated by brain can still occur
    - People paralyzed below waist can't feel genital stimulation, but genitals still respond to stimulation

Techniques to study brain

- Lesion technique
  - Brain function
  - Specific region of brain is purposefully destroyed in order to compare behaviour before and after surgery
  - Chemical, cold, electrical
    - May inhibit basic behaviours (i.e: eating) or complex ones (i.e: spatial memory)
  - **Transcranial Magnetic Stimulation (TMS) (Temporary 'lesion'**): also known as repetitive transcranial magnetic stimulation, is a non-invasive form of brain stimulation in which a changing magnetic field is used to cause electric current at a specific area of the brain through electromagnetic induction.
- Electroencephalogram (EEG)
  - Brain function
  - Brain activity creates magnetic fields that are measured by electrodes
  - Can identify specific pattern of responses to given stimulus (ERP)
- Positron Emission Tomography (PET) Scan
  - Brain function
  - Identifies areas of brain by looking at radioactive glucose consumption
    - Hot spots

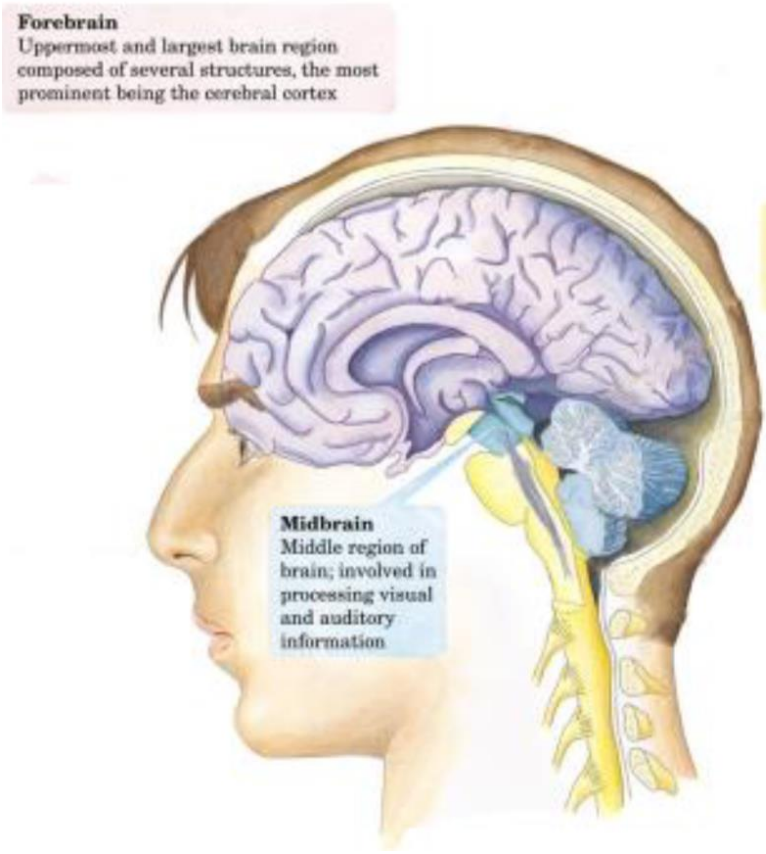


- Magnetic Resonance Imaging (MRI)
  - Brain structure
  - Magnet aligns atoms in brain; signal can be read to see shape and locations of structures
- fMRI
  - function and structure
  - watch activity over time, associated with behaviour
    - an fMRI scan identified 2 brain areas that became especially active when a participant lied about holding a five of club

CNS: The Brain

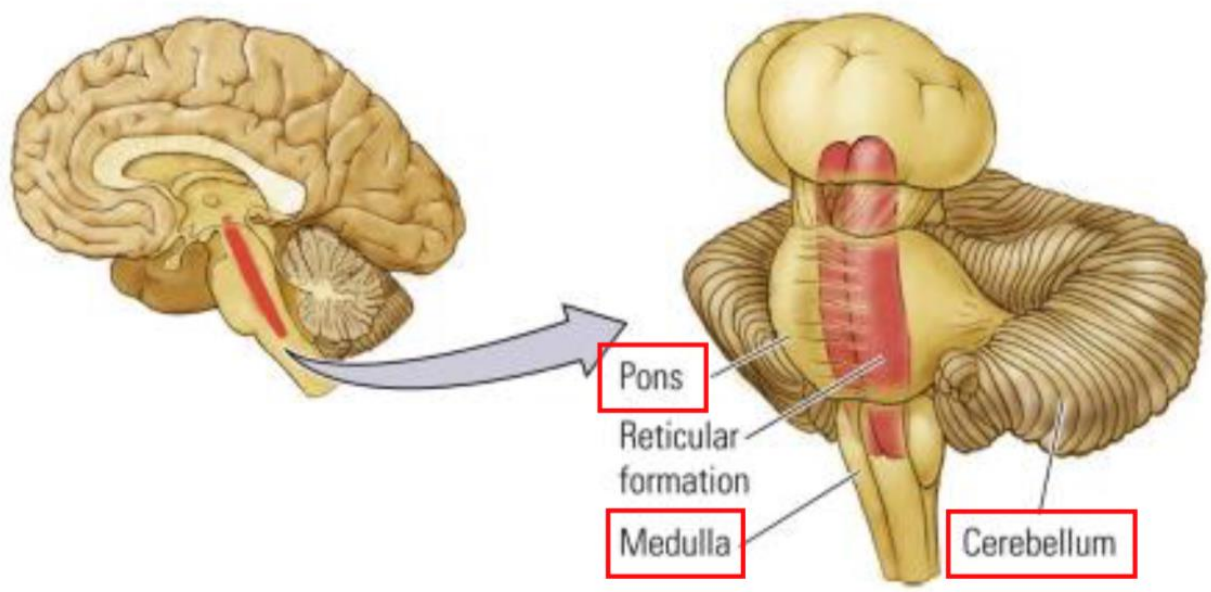
- What does it control?
- Complexity is linked to brain:body ratio
    - Many cases of bigger=smarter
- Also linked to structures
    - Certain structures are associated with more advanced abilities

Divisions of the brain



Like an archaeological dig: the lower you go, the older it is

Hindbrain

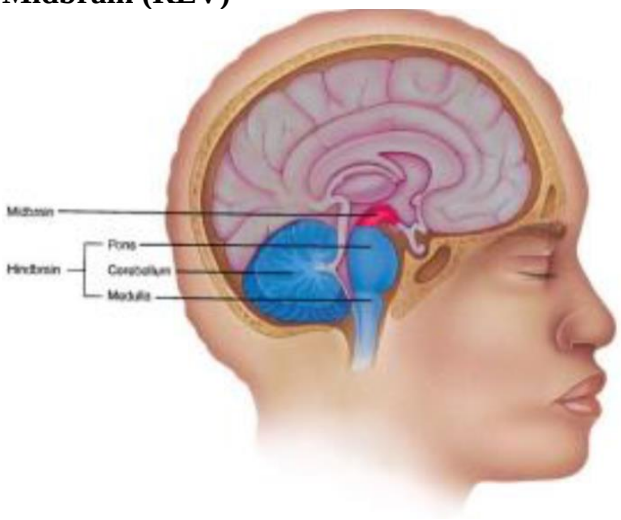


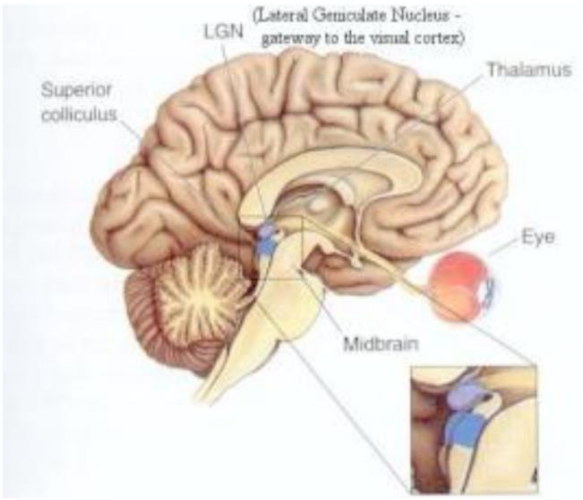
- Cerebellum
  - Regulates muscle tone, coordination of movements, balance
    - **Muscle Tone:** the continuous and passive partial contraction of the muscles, or the muscle's resistance to passive stretch during resting state
  - Integrates sensory and motor pathways
  - Damage: 'drunk' behaviour
- Medulla
  - Connects brain to spinal cord
  - Controls unconscious essential body functions
- Pons (VSW)
  - Connects brainstem and cerebellum
  - Gets info from visual areas to coordinate eye and body movements
  - Controls sleep and wake cycles
  - Relays info to cerebellum to control balance and coordinate movement

Ataxic Cerebral Palsy

- Motor disorder: low muscle tone, poor coordination, balance, fine motor
- Not inherited, non-progressive, permanent
- Damage to cerebellum
- 80% of cases cause in utero
- Some causes perinatally (injury, lack of oxygen) or in first few years of life
  - Testing for Ataxia: kid can't touch something ahead of them on first try
  - To keep balance, walk irregularly (bent forward, wide irregular steps)

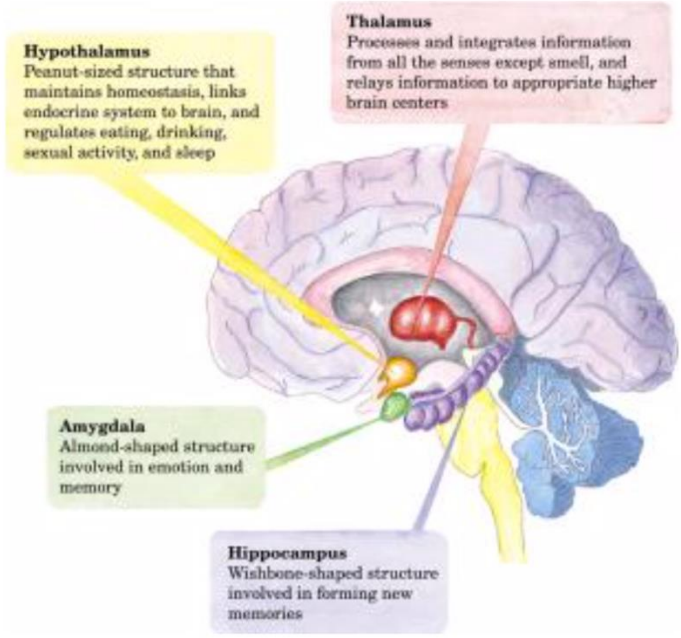
Midbrain (REV)





- Located below cerebral cortex and above hindbrain
- Uppermost part of brainstem
- Controls some reflexes
- Involved in control of eye movement and other voluntary movements

Forebrain (T-BG-L-AHH-C)



- Largest part of brain
- **Thalamus**
  - Processes and integrates sensory info from all senses except smell to higher areas
    - Sensory info hub
  - Regulates temp, reproductive functions, eating, sleep
- **Basal ganglia**
  - Wrapped around thalamus
  - Contain dopaminergic neurons

    - Death of those neurons: Parkinson's disease
- **Limbic system**
    - Important structures (**amygdala, hippocampus, hypothalamus**)
    - Important in forming memories, controlling emotions, making decisions, motivation, learning
- **Hippocampus:** Neural centre located in limbic system that processes memory storage
- **Hypothalamus (HHSS)**
    - Maintains homeostasis
    - Links endocrine system (hormones) to brain
    - Major control centre:
        - Regulates eating, drinking, sexual activity, sleep
    - Reward centre
    - Hypothalamus & homosexuality
        - Anterior hypothalamus: 4 nuclei
        - Size measured post-mortem in HeW, HeM, and HoM
        - HeM: nucleus 2-3x larger than in HeW and HoM
        - Replicated in sheep: 6-10% of rams are homosexual and show similar difference in hypothalamic size, also lower levels of testosterone
- **Amygdala**
    - Emotions
    - Evaluates threats in environment
        - Fear and anxiety
        - Overactive in people with anxiety disorders
        - Recent study shows decreases in amygdala size with mindfulness therapy
    - Damage/removal: docile behaviour
    - Stimulation: aggression/fear
- **Cerebrum (cortex)**
    - 2 hemispheres connected by corpus callosum
        - Composed of cerebral cortex, basal nuclei
        - Cortex: controls perception, memory, all higher cognitive functions
        - Each hemisphere has 4 lobes
            - **Frontal:** planning, motor, personality, attention, problem solving
            - **Parietal:** parietal: secondary visual, somatosensory
            - **Temporal:** primary auditory, memory, auditory langue + speech centres
            - **Occipital:** primary visual

I'm assuming the rest of this slideshow is about the Cerebrum

Crossover

- Sensations from right side of the body are represented on the left side of the brain and vice versa
- Specialized areas for motor and sensation

Somatosensory & Motor Cortices

- Input: Somatosensory cortex (L. hemisphere receives input from the body's right side)
- Output: Motor cortex (left hemisphere section controls the body's right side)

Examples of effects of brain damage

- Aphasia: (often caused by stroke: clot prevents blood flow to certain area; tissue dies)
    - Broca's area
        - Frontal lobe (usually left)
        - Production of words
        - Damage: can't 'find' words
    - Wernicke's area
        - Temporal lobe (usually left)
        - Comprehension of words
        - Damage: word salad
- Personality & impulse control
    - Phineas "no longer Gage" Gage
    - Damage: frontal lobe
- Agnosia
    - Damage: sensory area
    - Symptom: can't identify familiar objects
        - i.e: visual agnosia – can recognize by sound and touch, but not sight
    - Prosopagnosia – inability to identify faces
- Alzheimer's Disease
    - Degeneration/death of Ach neurons in hippocampus (memory) and frontal cortex
- Unilateral Neglect Syndrome
    - Damage: cortex
    - Usually unaware of any problem
    - Symptom: systematic neglect of contralesional side
    - Not blind or otherwise insensible to things on their left side. Can see things if their attention is explicitly drawn to them
- Split brain
    - Corpus callosum severed – no communication between hemispheres

On your own
- Read about:
    - Endocrine system
    - Brain plasticity
    - Right-left differences and handedness

Endocrine System
- **Endocrine System:** body's "slow" chemical communication system; a set of glands secreting hormones into bloodstream
- **Hormones:** chemical messengers manufactured by ES glands → travel thru bloodstream → affect tissues
- **Adrenal Glands:** pair of endocrine glands above kidneys; secrete epinephrine (adrenaline) and norepinephrine (noradrenaline) → arousal + alertness (during stress)
- **Pituitary Gland "Master Gland":** ES's most influential gland; with **hypothalamus (homeostasis, regulate, reward)** → regulates growth + control other ES glands
- Same as neurotransmitters in that chemicals that effects behaviour, but goes thru bloodstream so lingers longer

Brain Plasticity
- **Neurogenesis:** formation of new neurons
- Constrain-induced therapy aims to rewire brains and improve dexterity of brain-damaged child/adult stroke victim

Right-Left Difference & Handedness
- Left hemisphere controls right body, right hemisphere control left body
- Left hemisphere: speaking, calculating, language (sign, brail)
- Right hemisphere: perceptual
    - Inferences (copying drawings, recognizing faces, noticing differences, perceiving emotion, expressing emotion – left face more expressive)
    - Modulate speech (be clearer)
    - Orchestrate self-awareness
- Right-handed → language in left brain
- Left-handed → 70% language in left brain, 30% language in right or both hemispheres)
    - Common: musicians, mathematicians, baseball, cricket, architects, artists)
    - "Smarter"

Oct 2, 2019

Lecture 8: Sensation and Perception I

What's the difference?
- Sensation
    - Detection and representation of info through sensory receptors
        - Bottom-up

- Perception
    - Organization and interpretation of that info in the brain
        - Top-down

Vision

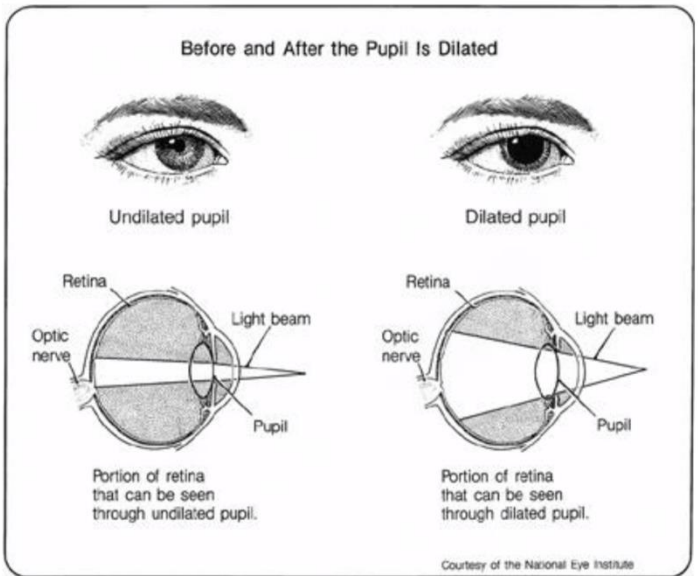
The eye transforms light energy into electrical (neural) energy

- Wavelength: colour
- Amplitude: brightness

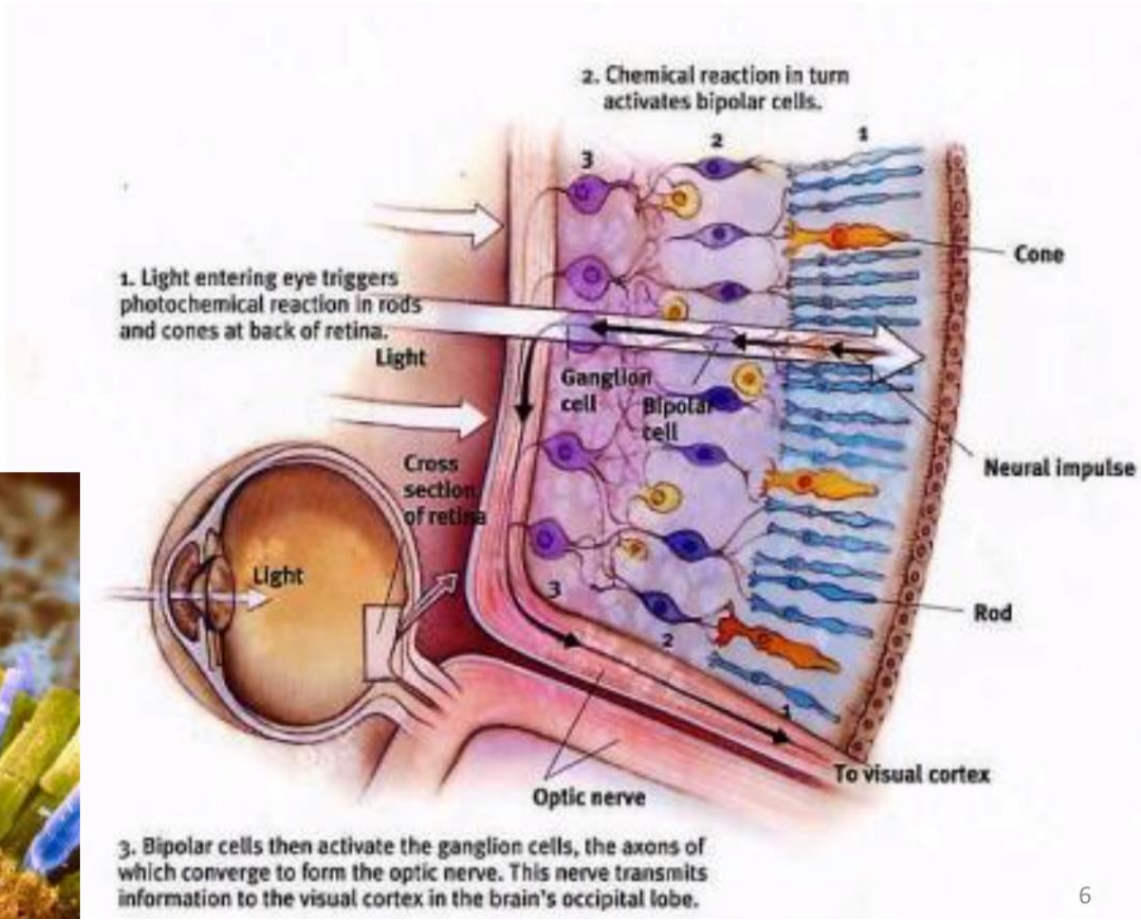
The Eye

- Iris: coloured muscle that control diameter of pupil
- Pupil: hole in iris for light to enter
- Lens: bends light to focus on retina (accommodation)
- Ciliary muscles: contract to change lens shape
- Retina: photoreceptors to transduce light to neural impulses
- Optic nerve: transmits signals to visual cortex
- Optic disc: blind spot caused by blood vessels

The pupil

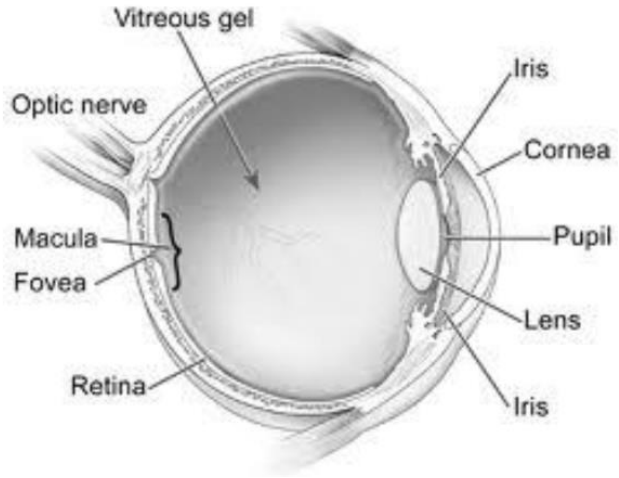


The retina



6

- Light entering eye triggers photochemical reaction in rods and cones at back of retina
- Chemical reaction in turn activates bipolar cells
- Bipolar cells then activate ganglion cells, the axons of which coverage to form optic nerve. This nerve transmits info to the visual cortex in the brain's occipital lobe



Photoreceptors

- Cones:
  - 6 million
  - Central vision (fovea)
  - Colour vision
  - Bright light
  - Good acuity (each has direct line to optic nerve)
  - 3 types: need all 3 to have full colour vision
- Rods
  - 125 million
  - Peripheral vision (periphery)
  - Black and white
  - Dim light (night vision)
  - Poor acuity (shared line to optic nerve)

Specialization

- Certain areas of brain respond (fire) to very specific types of stimuli
- Certain areas of brain recognize certain types of stimuli
  - Fusiform face area → recognize faces

Colour visions

- Trichromatic colour theory
  - Cones code red, green, blue
  - Activation of combinations allows us to see all colours
    - Red + Green = yellow
- Opponent process theory
  - 3 opponent processes in retina and thalamus
    - Red/green, blue/yellow, white/black
    - Some cells are turned on by each colour in the pair, others are turned off
    - Whatever cells are firing can get tired

Hearing

- Sound waves enter the ear and cause vibrations. These get transformed into neural (electrical) signals
- Amplitude: loudness
  - Measure in decibels
- Frequency: pitch (high/low)

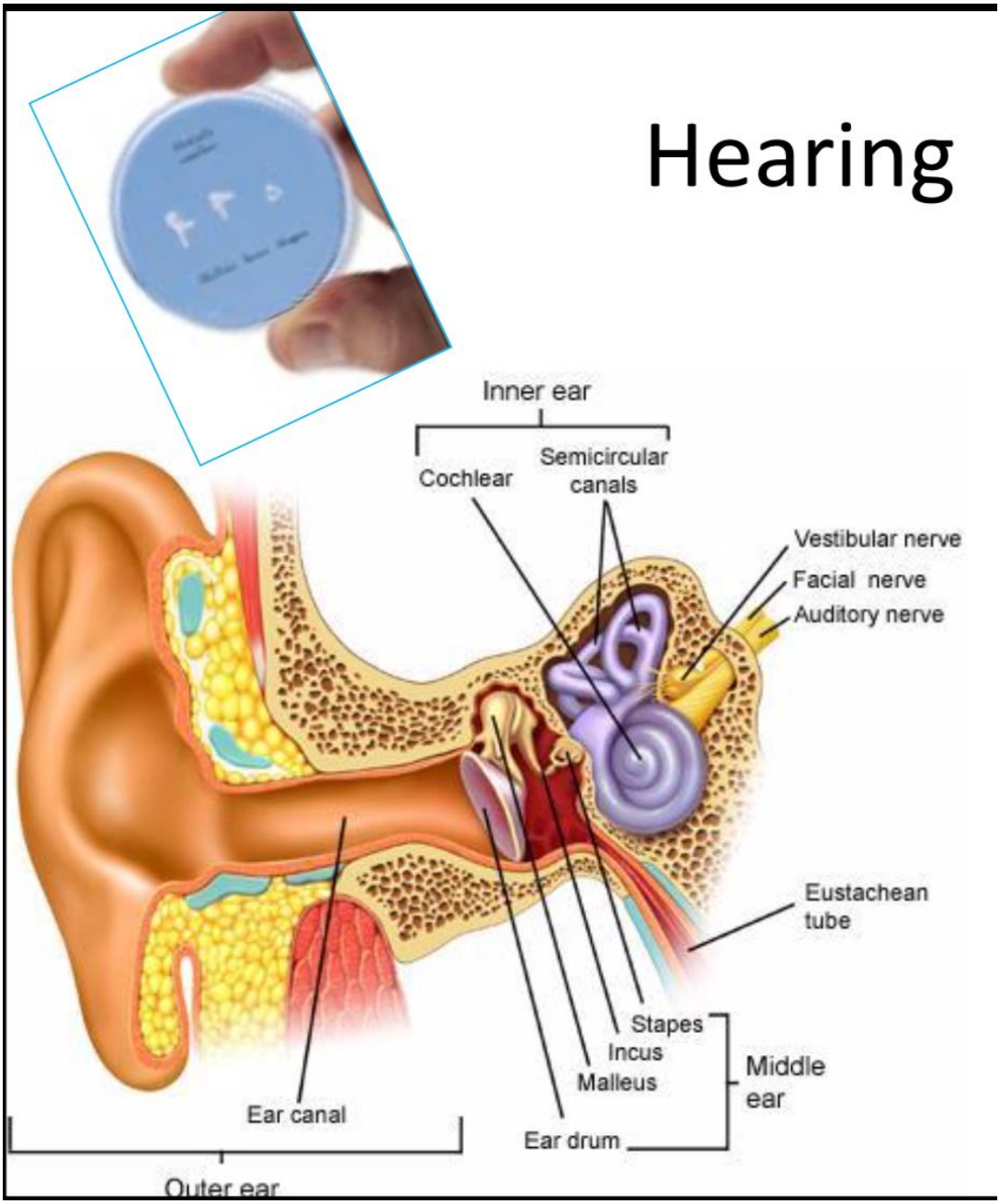
How do we hear? (TM-O-OW-CF-BM-CN-T-AC)

- Sound → vibrates tympanic membrane → vibrates Ossicles → vibrates oval Window → vibrates fluid in Cochlea → bends hair cells on basilar membrane → transmits impulses to cochlear nerve → thalamus → auditory cortex

Coding (Perception)

- Loudness
  - # of activated hair cells

        - Louder = more cells
- Pitch
    - Place theory: location on basilar membrane that code frequency
        - High: beginning; Low: end (sort of)
    - Frequency theory: brain codes frequency (rate) of impulses coming up auditory nerve
        - Works for low frequency sounds but neurons can't fire that fast in succession for high frequency sounds (so they trade off with one another)



Sound Localization

- Pinna (curved top part): cues; act as a kind of funnel which assists in directing the sound further into the ear.
- Timing:
    - Sound must travel farther to reach right ear as opposed to left ear
    - Difference in time of arrival gives a cue to localization
- Intensity
    - Head creates a sound shadow
    - Sound is slightly less loud in one ear than the other
        - Harder to localize from in front of you than from beside you

Hearing Loss

- Sensorineural (hair cells, auditory nerve, cortex)
    - Loud noises
        - Don't listen to your music max volume
    - Conductive
        - Age, ear infection, raptured ear drum, wax build-up

Hearing Aids

- Microphone, amplifier, speaker increase volume to inner ear
- **Cochlear Implants:** surgically implanted neuroprosthetic device providing sense of sound to a person with moderate/profound sensorineural hearing loss (lesion/disease to inner ear/auditory nerve). Cochlear implants bypass the normal acoustic hearing process, replacing it with electric signals which directly stimulate the auditory nerve.

Taste

- Chemical sense
- Taste buds on tongue
    - Reproduce every 7-14 days
- Preference result of genetic and environmental factors
- Enhanced taste sensitivity allows for better nutrition and toxin avoidance
- Nerve pathways to:
    - Hypothalamus (hunger)
    - Amygdala (emotions)
    - Hippocampus (memory)
    - Frontal cortex, somatosensory cortex (conscious perception)
        - Somatosensory: sensation that can be felt anywhere in body (pressure, pain, warmth)
- Link of food tastes to emotions, memories

Taste and Expectations

- Top-down control
    - 'Have a drink of milk' (OJ)
    - Wrapping on chocolates
    - Price of wine
        - Label on wine study

Smell

- Olfactory bulb (in forebrain)
- Size of postage stamp
- Old, chemical sense
    - Cells respond to chemicals dissolved in mucous
- Pathway links to
    - Frontal cortex (conscious perception)
    - Amygdala (emotions)
    - Hypothalamus (hunger, basic drives)
    - Hippocampus (memory)

Smell and Taste Interact

- Sense of taste worse with a cold or with your nose plugged
    - Try eating Jello with your eyes close and nose plugged; can you tell what flavor it is?
    - Try having your roommate close her eyes and smell a spoonful of Jello, then give her a different flavour; can he tell you correctly what flavour he's eating

Oct 7, 2019

Lecture 9: Sensation and Perception

Perception

- Sensation: what is sent from our sensory organs:
    - Optic nerves: brightness, colour, forms (simple)
    - Auditory nerves: loudness, pitch, timbre
- Perception: must translate into what we 'hear' and 'see'!
    - Object ID/recognition – what is it?
    - Depth – where is it
    - Movement – what is it doing?

Gestaltists

- German psychologists, 1920s – 1930s
- The whole is more than the sum of its parts
    - We organize pieces of info into wholes

Form Perception

- Several important perceptual habits allow us to perceive unified forms from stimuli
    - Figure and ground
    - Grouping
        - Proximity
        - Similarity
        - Continuity
        - Connectedness
        - Closure

Figure and Ground

- We need to be able to discriminate the figure from the background
    - Words on a page are the figure
    - Person's voice you're listening to at a party is the figure
- We do this quite automatically, but our perception can change depending on the stimulus

Proximity
- We group nearby figures together

Similarity
- We group similar objects together

Continuity
- We perceive continuous patterns rather than discontinued ones

Connectedness
- When objects are uniform and linked, we see them as a single unit

Closure
- We fill gaps to create a whole object

Object recognition
- Influenced by expectations/focus of attention
    - Amazing Colour Change example/Gorilla example
- A combination of **bottom-up (stimulus driven)** and **top-down (knowledge/expectation-driven)** processes

Motion Perception
- We can build a perception of motion from quickly flashing scenes
    - Cartoons do this
    - ISI (inter-stimulus interval): the temporal interval between the offset of one stimulus to the onset of another

Apparent Motion
- The appearance of real motion from a sequence of still images. Apparent motion occurs whenever stimuli separated by time and location are actually perceived as a single stimulus moving from one location to another.
- Images that look like they're moving but they aren't because our eyes deceive us

Depth Perception
- Monocular cues
    - Accommodation
    - Motion parallax
    - Pictorial
- Binocular cues
    - Convergence
    - Retinal disparity

Binocular

- **Convergence**
  - Finger at arm's length, looking at it as you bring it closer to you
  - Eye muscles: feedback
- **Retinal Disparity**
  - See a slightly different view with each eye

Monocular

- **Accommodation**
  - Lens adjusts depending on distance (flatter when further away view, bulkier when closer view)
- **Motion Parallax (relative motion)**
  - Nearby objects seem to move faster than distant ones
    - Driving, paddling, running
- **Pictorial (I-RS-LP-T-S)**
  - **Interposition**
    - Object A partially blocks object B → perceive A as closer
    - Most effective with familiar objects
    - Gestalt closure influences this (fill gaps to create whole object)
  - **Relative Size**
    - If we assume 2 objects are similar in size, the one that cases the smaller retinal image is perceived as being more distant (further away → appears smaller)
  - **Linear Perspective**
    - Even though train tracks are parallel, they appear to converge to a single point in horizon (more convergence → further away)
  - **Texture**
    - Closer objects have more texture visible than distant objects
  - **Shading**
    - We're used to light from above, we automatically use pattern of light striking object to tell us whether object surface is approaching or receding away from us
      - If light hit bottom of object, we perceive receding
      - If light hits top of object, we perceive approaching

Colour Constancy

- In a consistent context, we perceive colour of object to be constant
  - i.e: apple in kitchen as day ends
- but when context changes, our perception does too

Perception organization beyond vision

- foreign vs. familiar language
  - sounds faster
  - harder to parse into figure/ground (words)
    - true orally and visually

On your own

- Read
  - Sensing the World: Some Basic Principles (p. 230-234)
  - Sensory Adaptation (p. 234-236)
  - Touch (p. 252-254)
  - Pain (p. 255-258)
  - Perceptual adaptation (p. 274)
  - Perception and the human factor (p. 279-281)
  - Is there ESP (p. 282-285)

Oct 23, 2019

Lecture 10: State of Consciousness

What is consciousness

- **Consciousness:** awareness of ourselves & our environment
  - A spotlight on an aspect of our daily life
    - External or internal focus
    - Past, present, future

Studying consciousness

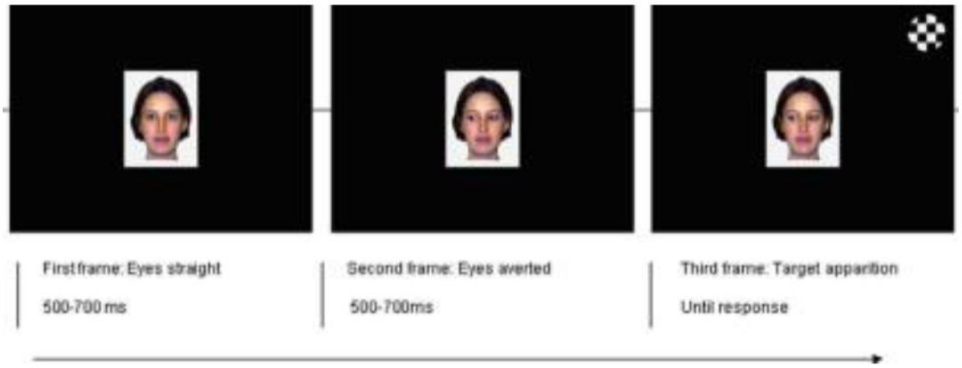
- Cognitive neuroscience: study of brain & mental processes
- Much processing occurs beyond our consciousness
  - Behaviour and mental states can conflict, or at least separate
    - Blindsight
    - Hollow face illusion
      - We see it as convex but touch it as concave

Selective attention

- We tune out a lot
- There's limited amount we can consciously process at any one time
- Certain things capture hold our attention
  - Cocktail party effect (hear name and some of what was directly said before)
  - Driving with phone vs. Passenger
  - Change blindness
  - Pop-out phenomenon (find L/l's in picture with a lot of T's when black & white vs. coloured L/l's)

Conscious vs. automatic processing

- We tune out a lot in our consciousness, but we still take it in somewhere
    - Cocktail party effect: hear your name, can you think back to what was said *before* it
    - Priming: eye gaze (take some notes on this; Schuller & Rossion, 2005)
    - https://www.frontiersin.org/articles/10.3389/fnhum.2016.00619/full
    - Basically, more eye contact = paying more attention? Read to understand better^

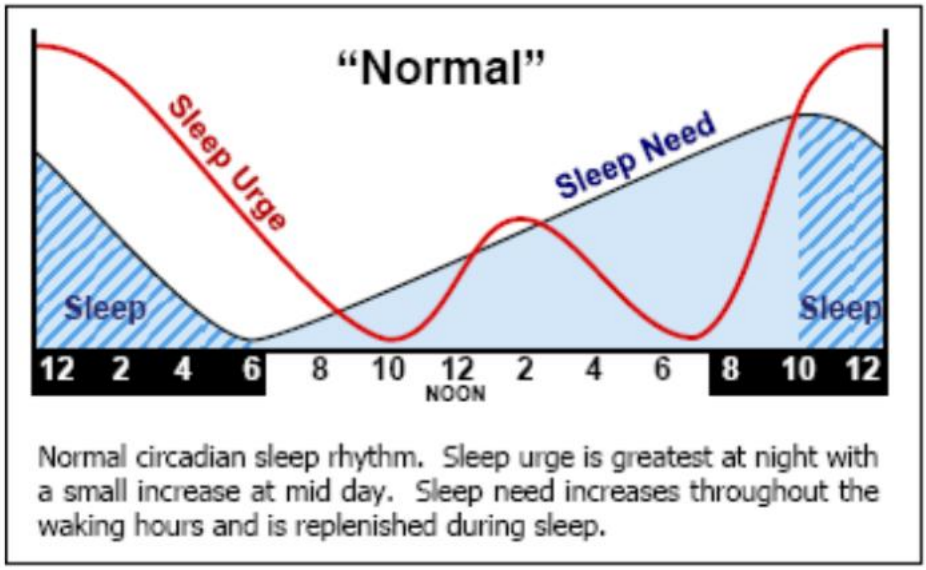


Sleep and Dreams

- Circadian rhythm
- Why do we sleep
- Sleep stages
- Dreaming

Circadian Rhythm: our biological clock

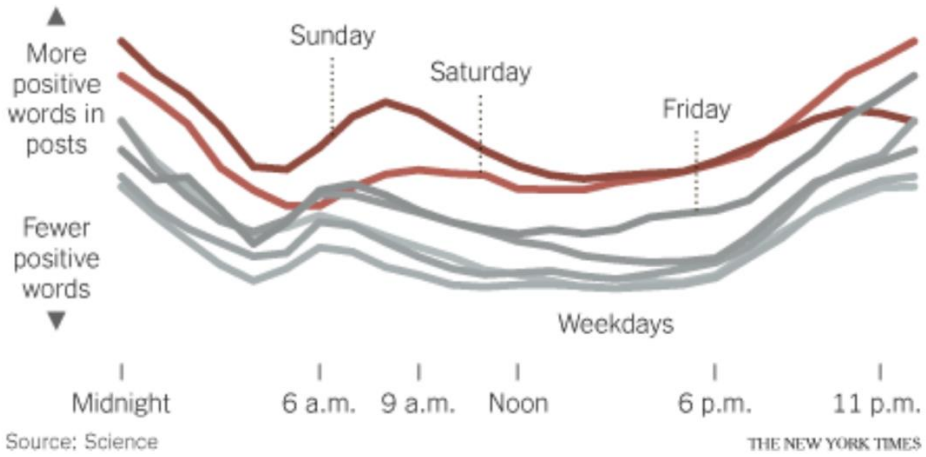
- Follows approx. 24-hour cycle
- Influences
    - Wakefulness
    - Body temp
    - Memory
- Changes with age
    - University students: active late
    - Older adults: active early
        - Transition starts around age 20
            - Earlier for women than men



Normal circadian sleep rhythm. Sleep urge is greatest at night with a small increase at mid day. Sleep need increases throughout the waking hours and is replenished during sleep.

Circadian rhythms on Twitter!

A textual analysis of more than 500 million Twitter messages found people around the world tend to express more positive emotions in the morning and evening, and are most positive on weekends. The recurring daily pattern suggests moods are influenced by sleep and circadian rhythms.



The Circadian System

- Structures
  - Suprachiasmatic nucleus (SCN)
    - In hypothalamus
    - Controls CR by controlling release of melatonin by pineal gland
- Chemicals
  - Melatonin: sleep-inducing hormone
    - Production decreases with light (morning) and increases as it gets dark out
  - Adenosine: inhibitory neurotransmitter, causes drowsiness
    - Accumulated during day, declines during night

Light and Circadian Rhythm

- Morning light on retina stimulated suprachiasmatic nucleus in hypothalamus to decrease melatonin production
- Jet lag: travelling to other time zones disrupts circadian rhythm
  - Can ‘reset the clock’ by exposing yourself to bright light

Blindness and CR: Mechanism

- Desynchronized circadian rhythm (longer)
    - Up to 50% of blind individuals
- Light hits eye but not perceived
    - No signal to trigger melatonin production
- Treated with melatonin or melatonin agonists

Summary

- Melatonin production is shut off by light
- Melatonin production increases in the dark
- Melatonin makes us sleep
- If we want to 'reset our clock' as in the case of jet lag, we can
    - Expose ourselves to light: decrease melatonin prod. → less likely to fall asleep
    - Melatonin Pill: replace melatonin not produced in a different time zone → sleep

Caffeine and Circadian Rhythm

- Adenosine binds → neurons, decrease activity → drowsy
- Caffeine fits adenosine receptors, doesn't decrease their activity; instead makes it fire
    - Caffeine is an antagonist
- Pituitary gland responds to increase firing
    - Releases hormones that make adrenal glands produce adrenaline
        - 'fight or flight' hormone, activates sympathetic nervous system
- **Summary:**
    - Adenosine → receptors on neurons → dec. activity → drowsy **(agonist)**
    - Caffeine → adenosine receptors → inc. activity (fire) → pituitary gland release hormones → adrenal glands → adrenaline **(antagonist)**

Why do we sleep

- We sleep 1/3 of our life
- Most need 7-9 hours/night
    - Cultural & individual differences
    - Age differences
    - Genetic influences: identical twins more similar than fraternal twins
- Without sleep for several days:
    - Dec. immune function, concentration
    - Inc. accident risk

Effects of sleep deprivation (sleep debt)

- Irritability
- Cognitive impairment
- Memory lapses or loss
- Impaired moral judgement
- Severe yawning
- Hallucinations
- Symptoms similar to ADHD
- Impair immune system
- Risk of Type 2 diabetes

- Inc. heart rate variability
- Risk of heart disease
- Dec. reaction time, accuracy
- Tremors
- Aches
- Other include
    - Growth suppression
    - Risk of obesity
    - Dec. temp
    - Fatigue and subsequent death
    - Impaired concentration
    - Poor learning and memory
    - Inc. appetite and eating

Theories of sleep (PRCG)

- Protective: it's dangerous to be out at night
- Restorative: when we don't have to process the outside world, our body/brain has time to repair itself
- Cognitive processes:
    - Memory better after several hours sleeping than several hours awake
    - Creative insight, thinking 'outside the box' more likely after sleep
- Growth: GH released by pituitary gland during sleep

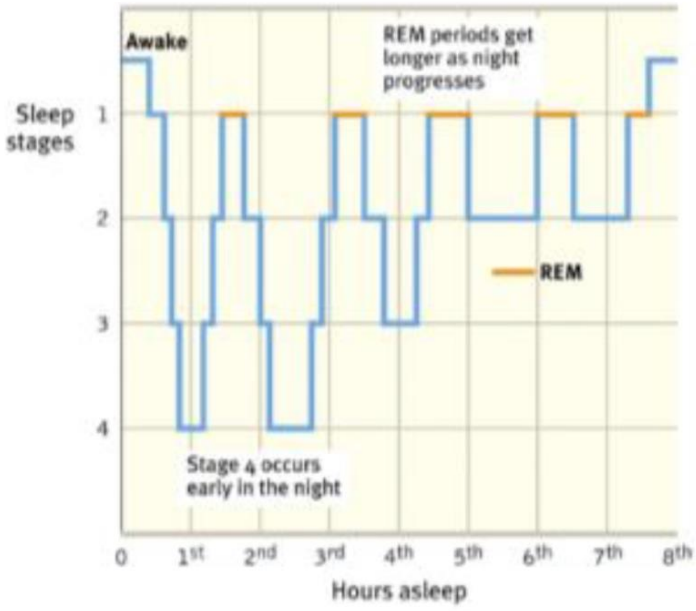
Measuring sleep

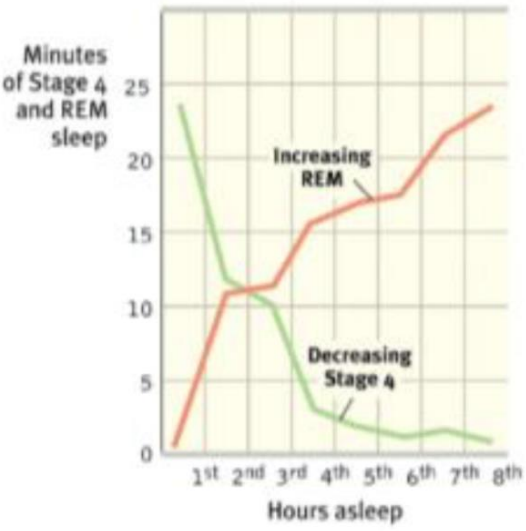
- Left eye movements
- Right eye movements
- EMG (muscle tension)
- EEG (electroencephalogram) (brain waves)

Sleep stages (90-minute cycle)

- You don't want to wake up in stage 3 or 4

Awake but relaxed	Eyes closed, awake	α waves (14-9 cps)	Regular, i.e: meditation
Sleep Stages 1-2	Light sleep, early	θ waves (8-5 cps)	Irregular
Sleep Stages 3-4	Deep sleep	δ waves (4-1.5 cps)	
Stage 5: REM Sleep	Moves to Stage 1, like awake, aroused state but asleep	β waves (40-15 cps)	Regular, dreaming





Why is it good that we're paralyzed during REM?

- During rapid eye movement (**REM**) **sleep**, dreaming is frequent, but the body's muscles are relaxed to the point of **paralysis**, perhaps to keep people from acting out their dreams. Researchers have found that two brain chemicals, glycine and GABA, are responsible for this muscle **paralysis**.
- **Paralysis in muscles: glycine and GABA**
- https://www.livescience.com/27621-sleep-paralysis-scary.html
- Do more research

Dreams

- How and why do we dream?
  - http://vsx.onstreammedia.com/vsx/pbssaf/search/search?query74=Pieces%20of%20Mind&query_field74=vlabel_EpisodeTitle&query_op74=must_contain&pageSize=999&search_type=VIR_CAT_CLIP&query75=Public&query_field75=clabel_Access&query_op75=must_contain&sort=vlabel_Date&sort_dir=-&sort2=VIR_ASSET_ID_FIELD&sort_dir2=+%27
  - Take notes on this

Discussion and review of major concepts

- Priming task: measures how good brain is at making associations. How?
  - How do you think this works in the brain?
- How do we dream? Our brains are especially good at making sense of random associations during REM sleep
  - What evidence do they give in support of this?
- Why do we dream? To learn.
  - What evidence do they give in support of this?
    - Sample of convenience?
    - Paired associate task?
    - Logic task?

Oct 28, 2019

Psychology Lecture 11: States of Consciousness II

Drugs and Consciousness

- Psychoactive Drug: a chemical substance that alters perceptions and mood (affects consciousness)

Dependence & Addiction (DAT-W)

- **Dependence:** absences drug → feeling of physical pain, intense cravings (physical dependence) + negative emotions (psychological dependence)
- **Addiction:** compulsively crave drug despite adverse psychical + psychological consequences
- **Tolerance:** when you use a drug repeatedly, your body anticipates it and counteracts its effects. You need more drug to get the same effect.
- **Withdrawal:** you can tell when the drug is no longer in your body. Your body is still counteracting its effect but is no longer there.

3 categories of psychoactive drugs

- **Depressants:** dec. neural activity and slow body functions
    - Alcohol, barbiturates (sedative), opiates, heroin
- **Stimulants:** inc. neural activity and speed up body functions
    - Caffeine, nicotine, cocaine, ecstasy, amphetamine, methamphetamines
- **Hallucinogens:** distort perceptions, evoke sensory images sans sensory input
    - LSD (acid), THC (marijuana)

Alcohol

- Inc. inhibitory pathways (GABA) dec. excitatory pathways
- Dec. inhibitions (cortex)
    - Placebo effect: happens when you think you've had alcohol
- Dec. memory formation (hippocampus)
    - Interferes with REM
- Dec. self-awareness (frontal lobe)
- Exaggerates emotions (amygdala)
- Dec. neural processing (multiple areas)
    - Reaction time, slurred speech
- Dec. coordination and balance (cerebellum)
- Inc. sexual desire, dec. sexual ability (hypothalamus)
- Diuretic (pituitary gland, hypothalamus)
    - Inhibits secretion of hormone that signals kidneys to absorb water
- Induces sleepiness/coma/death (medulla)

Cocaine

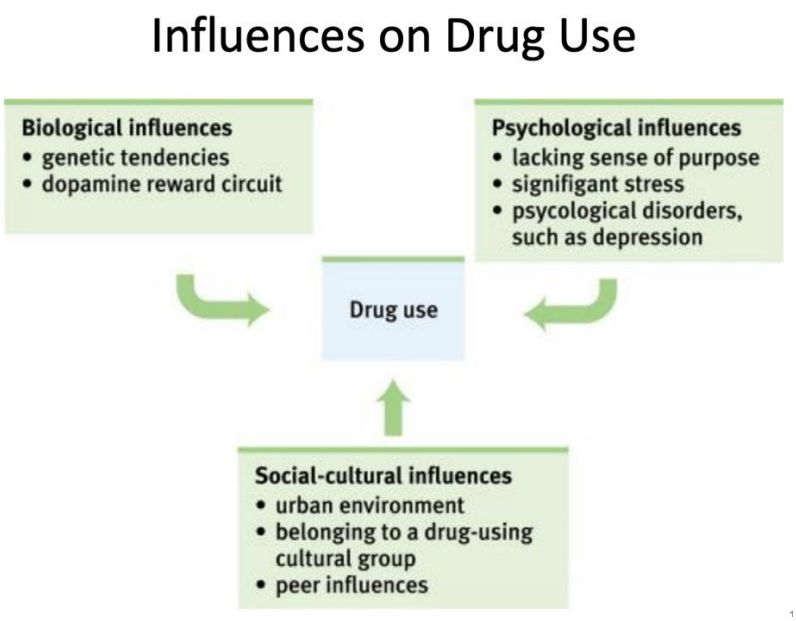
- Induces immediate euphoria followed by a crash
- **Steps:** cocaine → reabsorbing NT sites → block D, NO, S → D, NO, S remain in synapse → inc. mood effects → euphoria → dec. cocaine + no NT → crash

Ecstasy (MDMA)

- Stimulant, mild hallucinogen
- Euphoric high
- * CAN* damage serotonin-producing neurons (permanent low mood, impaired memory)

A GUIDE TO SELECTED PSYCHOACTIVE DRUGS

Drug	Type	Pleasurable Effects	Adverse Effects
Alcohol	Depressant	Initial high followed by relaxation and disinhibition	Depression, memory loss, organ damage, impaired reactions
Heroin	Depressant	Rush of euphoria, relief from pain	Depressed physiology, agonizing withdrawal
Caffeine	Stimulant	Increased alertness and wakefulness	Anxiety, restlessness, and insomnia in high doses; uncomfortable withdrawal
Methamphetamine ("speed," "ice")	Stimulant	Euphoria, alertness, energy	Irritability, insomnia, hypertension, seizures
Cocaine	Stimulant	Rush of euphoria, confidence, energy	Cardiovascular stress, suspiciousness, depressive crash
Nicotine	Stimulant	Arousal and relaxation, sense of well-being	Heart disease, cancer (from tars)
Ecstasy (MDMA)	Stimulant; mild hallucinogen	Emotional elevation, disinhibition	Dehydration, overheating, and depressed mood, cognitive, and immune functioning
Marijuana	Mild hallucinogen	Enhanced sensation, relief of pain, distortion of time, relaxation	Impaired learning and memory, increased risk of psychological disorders, lung damage from smoke



Oct 30, 2019

Lecture 12 & 13: Learning

What is learning?

- *Definition: relatively permanent change in behaviour due to experience*
    - We must be able to adapt to our environment

Learning

- Involves changes in nervous
- Allows us to adapt behaviours to environment
- Involved interaction among *motor, sensory, memory systems*

Types of learning

- Habituation
- Classical conditioning

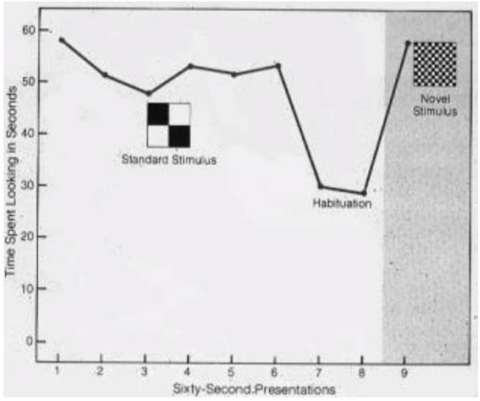
- Operant conditioning
- Observational learning

Habituation

- *Definition: A decline in responsiveness after repeated presentation of a stimulus*
- Respond less once stimulus becomes familiar
- Usually in simple reflexing behaviours or sensations
- Demonstrates memory
- Useful in animal and infant studies
- Examples
    - Airplane (smell)
    - Clothing (smell, tightness/looseness of clothing)
    - Infant
    - Others?

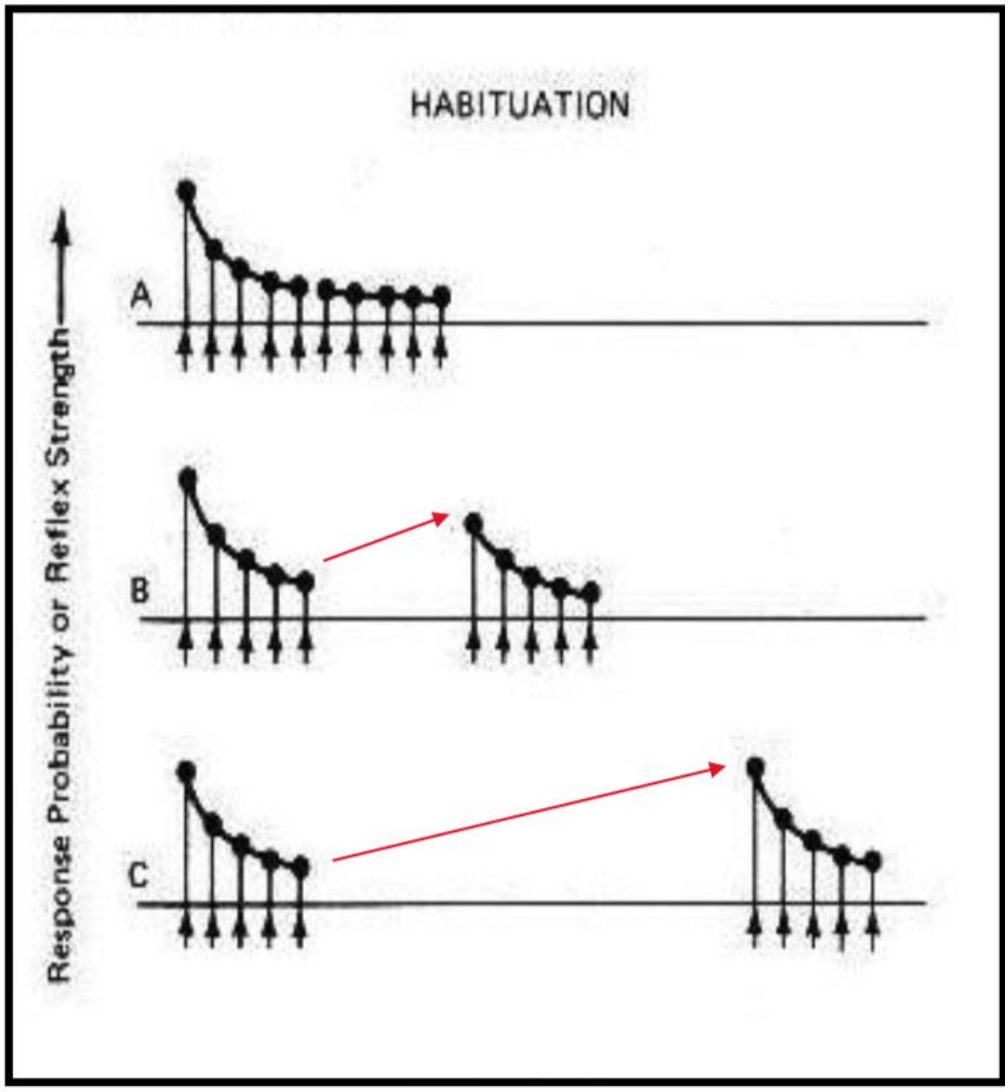
Habituation Paradigm

- Can infants discriminate difference in grating density?
    - Repeatedly show one grating, then show the other
    - Does the infant look longer (dishabituate)?
    - Easier to determine what standard stimulation is (black & white checkered) → habituation; dishabituation: prefer looking at novel stimulus (determine a difference and therefore stare at that harder one longer; if they don't stare novel stimulus for a long time, it can be assumed they assume think it looks like the standard stimuli → poor learning because they're infants lol)

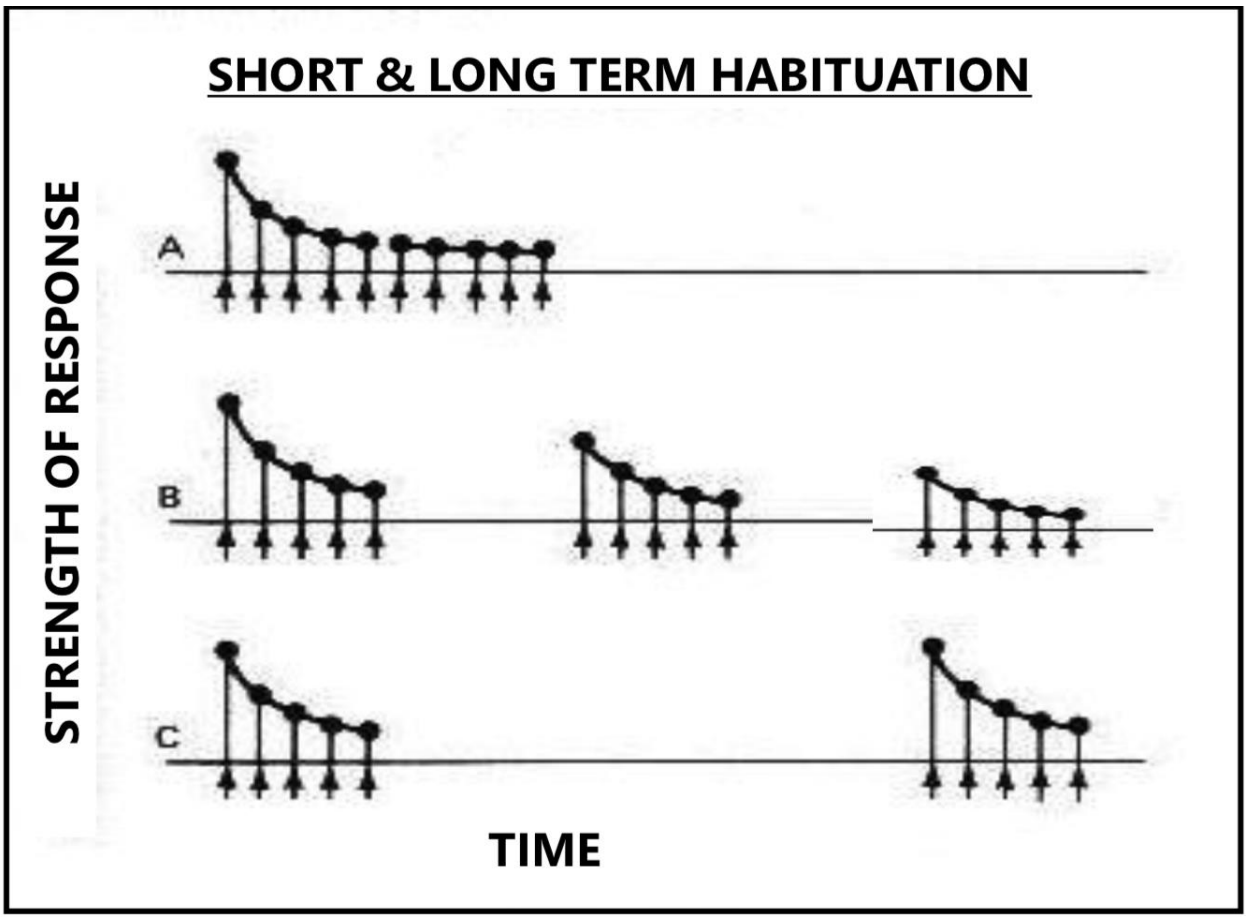


Habituation (cont.)

- Can be short- or long-term
- Is specific to that stimulus
- Response decreases with repeated stimulation
- With time → *partial recovery*
- With ENOUGH time → *full recovery*



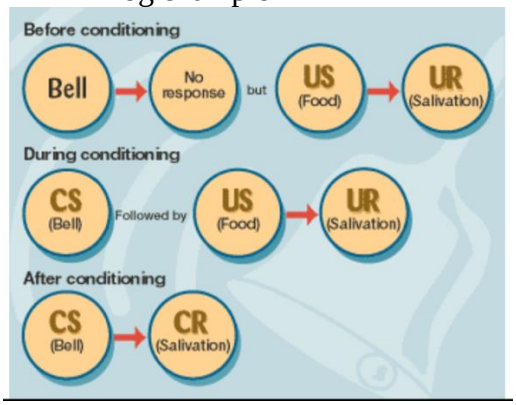
- A: short term
- B: long term (like going back to class and learning same thing → response not as high as when we first learned it but still stimulated)
- C: longer term (like learning same thing next semester → response very similar to when first exposed)



- A: short
- B: long term (multiple classes → smaller initial responses as you become habituated)
- C: longer term (same high response to stimuli after long time)

Classical Conditioning

- *Learned association between neutral stimulus and meaningful stimulus; learned association*
- Ivan Pavlov (1849-1936)
  - 'Pavlovian conditioning'
  - Digestion research
- Dog example



- Form association between 2 types of stimuli:
    - Unconditioned (US): automatically provokes response (UR)
    - Conditioned (CS): does not provoke response
    - During conditioning, pair CS and US repeatedly
    - Test of learning: does CS alone produce conditioned response (CR)

Classical Conditioning: Little Albert Example

- Before training
    - Noise (US) → Fear/cry like a bitch (UR)
    - Rat (CS) → ?(CR)
- Training (conditioning)
    - Rat (CS) → Noise (US) → Fear/cry like a bitch (UR)
- After Training
    - Rat (CS) → Fear/cry like a bitch (CR)
- Second-Order Conditioning *(aka Higher-order Conditioning)* → weaker than 1st order
    - Cage (CS2) → Rat (CS) → Fear/cry like a bitch (CR)
    - Therefore: Cage (CS2) → Fear/cry like a bitch (CR)

Classical Conditioning

Ethan automatically shows signs of arousal when sees imaged of scantily dressed women. Pics of beer labels don't elicit reflexive response. Brand X beer shows scantily dressed women in commercials. Repeated pairings of images of women with Brand X beer labels → signs of arousal when Ethan sees Brand X beer labels.

- Scantily dressed women (US) → Arousal (UR)
- Beer X label (CS) → ?(CR)
- During Conditioning: Beer X label (CS) + Scantily dressed women (US) → Arousal (CR)
- After Conditioning: Beer X label (CS) → Arousal (CR)

Real-life Applications

- Taste aversions (US – tequila + milk, UR – vomit, CS – milk, CR – fear, disgust)
    - *UR + CR **DON'T** have to be the same*
- Phobias (US – bee sting, UR – fear, CS – hear buzzing, CR – fear)
- Drugs
- Physiological compensatory responses

Classical conditioning helps us <u>prepare</u> for stimulus

Drugs and Classical Conditioning

- Compensatory response
- Critical components
    - Drug
    - Physiological effects
    - Environmental characteristics/events
    - Homeostasis attempts
- Withdrawal worse when in setting where drug was taken
- Example
    - US: Heroin;

- UR: Blood Pressure decreases;
- CS: Needle, tourniquet, dirty couch;
- CR: Blood pressure increases (preventatively, body knows BP is about to drop)
- Change location, use different needle + tourniquet + couch = NO CS, NO CR (blood pressure doesn't inc. to protect you) → take more heroin than usual → overdose (celeb hotel overdoses)

Nov 4, 2019

Acquisition (initial learning)

- Order is important: CS → US
- **Forward Conditioning:** CS presented before US. CS stays on until US presented. Most effective, especially when SHORT delay
  - Bell begins to ring, continues to ring until food presented
- **Simultaneous Conditioning:** CS & US presented together. Not every effective
  - Bell begins ringing @ same time food presented, bell + food begin, continue, end @ same time
- **Backward Conditioning:** US occurs before CS
  - Food presented, then bell rings. Not very effective (exception → pain)

Extinction

- Give CS without US (bell, no food)
- Lose CR to CS
- Spontaneous recovery
  - With passage of time, CS occurs again (weaker)

Generalization

- CR to range of CS-like stimuli
  - US: shock
  - CS: 500Hz tone
  - CR: fear of tone
  - Other CS: 300-700Hz
  - Generalization gradient

Discrimination

- CR is very specific to CS
- Opposite of generalization
- Pair 500Hz (CS+) with shock (US) but not 600Hz (CS-)
- CS- also learned
- Negative contingency

Summary

- Classical Conditioning involves learning an association between 2 stimuli
- This association can help prepare for 1 stimulus (US) by knowing it typically occurs with the other stimulus (CS) → preparation shown by CR

- CR often same behavior as US
    - But it is in response to diff stimulus

Operant Conditioning

- Classical conditioning: forms association between 2 stimuli
- **Operant conditioning:** forms association between behaviour and consequence
    - Thorndike's Law of Effect: rewarded behaviour is likely to recur
- 1) baseline rate of behavior is observed
- 2) consequence of behaviour is introduced
- 3) as a result of consequence → change in rate of occurrence of behaviour

Can lead to complex behaviour

- Behaviour emitted semi-randomly, modified by consequences
- Learn contingency between behaviour & consequences
    - i.e: sounds → words in infants

Types of consequences

- Does behaviour inc. or dec. in frequency?
    - Inc.: reinforcement
    - Dec.: punishment
- Is behaviour affected by *addition* or *removal* of stimulus?
    - + : positive
    - – : negative

Behaviour	**Stimulus Added**	**Stimulus Removed**
Inc.	**Positive reinforcement** - "Sit," dog sits → gets treat - Next time: sits again	**Negative reinforcement** - Leave for work before rush hour → miss traffic - Leave for early again
Dec.	**Positive punishment** - Julie hits classmate → goes to principal - Doesn't hit classmate again	**Negative punishment** - I swear at mom → lose TV privileges for week - Swearing dec.

Timing of consequences

- Best learning occurs when consequence is delivered ASAP after behaviour
    - Prevents confusion

Generalization, Discrimination, Extinction

- Possible in operant conditioning too
- Generalization: teach pigeon to peck red key to get food; learns to peck any key
- Discrimination: give food when pigeon pecks red, not yellow; learns to peck red key
- Extinction: stop delivering food for pecking keys, stops pecking
- Example:
    - Child cries in store → mother gives chocolate bar → kid stops crying; kid cries again in store
    - Mom: negative reinforcement ***
    - Child: positive reinforcement ***

Shaping

- Some behaviours happen by chance → individuals learn to repeat
    - Some behaviours are complex (might never occur by chance)
- We can reinforce successive approximations to desired behaviour
- Video: https://www.youtube.com/watch?v=2QY2UxBStvo&NR=1

Primary and Secondary Reinforcers

- Primary: unlearned, rooted in biology. Create comfort/end discomfort
    - Examples: food, desired sleep, sex, shelter
- Secondary: learned thru association w/ primary reinforcer
    - Examples: money, education, exercise, video games
    - Repeated pairing of natural reinforcer with stimulus (trained chimpanzees to work for poker chips → get vending machine grapes)

Schedules of Reinforcement

- Continuous
    - Reinforced every time behaviour occurs
- Partial (intermittent)
    - Reinforced sometimes when behaviour occurs

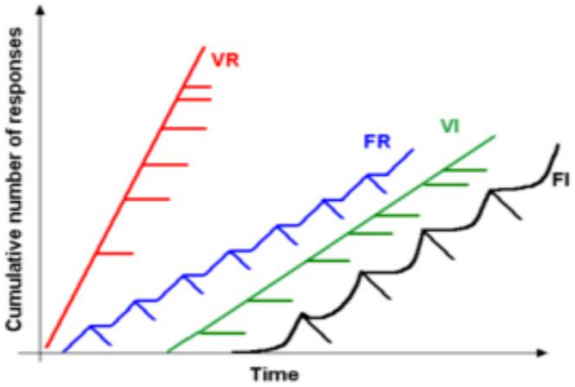
Partial Reinforcement

- Fixed Ratio (FR): reinforces after given # of correct responses
    - Get free coffee after buying 9
- Variable Ratio (VR): reinforces after unpredictable # of correct responses
    - Win at slots after pulling handle average of 100 times
- Fixed Interval (FI): reinforced for first correct response a set time period
    - Check mail – arrives after 24 hours
- Variable Interval (VI): reinforces for first correct response after unpredictable time period
    - Check email – new message every 10 mins on average

Effects of reinforcement schedules

- Which would work best for acquisition?
    - Continuous Reinforcement
- Which would lessen probability of extinction?
    - "Resistance to extinction"
    - Partial Reinforcement
- Humphrey's Paradox
    - Behaviour + consequence fewer times → better learning

Response patterns



Note: Dashes mark delivery of reinforcer

VR > FR > VI > FI

Humphrey's Paradox Again…

- Which would have better resistance to extinction: FR25 or FR250 (A: FR250)

Observation learning

- Aka modelling
- Imitating someone else's behaviour
  - Or noticing consequences of another person's behaviour (latent)
- Mirror neurons (activate when we see something happening)
- Observation models help us
  - Learn new behaviours
  - Determine when to make or avoid making certain responses, depending on observed consequences of behaviours
  - Learn rules that can be applied to new situations
- To learn through modelling, we must
  - Pay attention to model
  - Remember what was observed
  - Be able to reproduce modelled behaviour (latent learning → learn before do)
  - Be motivated to display behaviour (latent learning)
- We are more likely to reproduce observed behaviour if
  - We observe the model being rewarded for behaviour
  - Model is attractive, trustworthy, capable, admired, powerful, high status, etc

On your own

- For reach example, identify which type of conditioning (classical or operant)
- For classical conditioning examples, identify
  - US< CS, UR, CR
  - Explain how we might (or do) see generalization, discrimination, and extinction within example
- For operant conditioning examples, explain
  - Whether positive/negative reinforcement/punishment
  - Explain how we might (or do) see generalization, discrimination, and extinction within example

Nov 6, 2019

Lecture 14: Memory I

Memory
- Learning that lasts
- Learning that's stored
- Learning that's retrieved to be accessed
- We need memory to survive, but we also need to forget

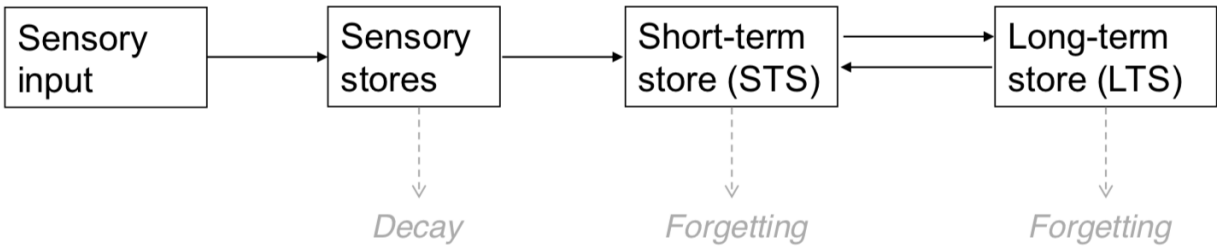
We remember a lot automatically (without effort)
- Time
  - Where did you last see your cell phone?
- Space
  - What part of page did you finish on?
- Frequency
  - How many times have you seen your friend today?
- Familiar info
  - Hard to 'turn off' well-practiced skills (Stroop effect → colour of ink different from name of colour)

But how does it all work?
- How do we get info in?
- How do we store it?
- How do we retrieve it?
- Are there different types of memory?
- Can we use strategies to remember things?

Memory models
- Models = theories
  - Abstractly describe general way mind processes info
- Diagrams
  - Boxes represent components of mind
  - Arrows represent flow of info
- Models tested by testing hypotheses they generate on real people

Info-processing models
- View mind as computer
  - Encoding (type)
  - Storage (save)
  - Retrieval (search and open)

Modal Model of mind (info-processing model)
- Multi-store model



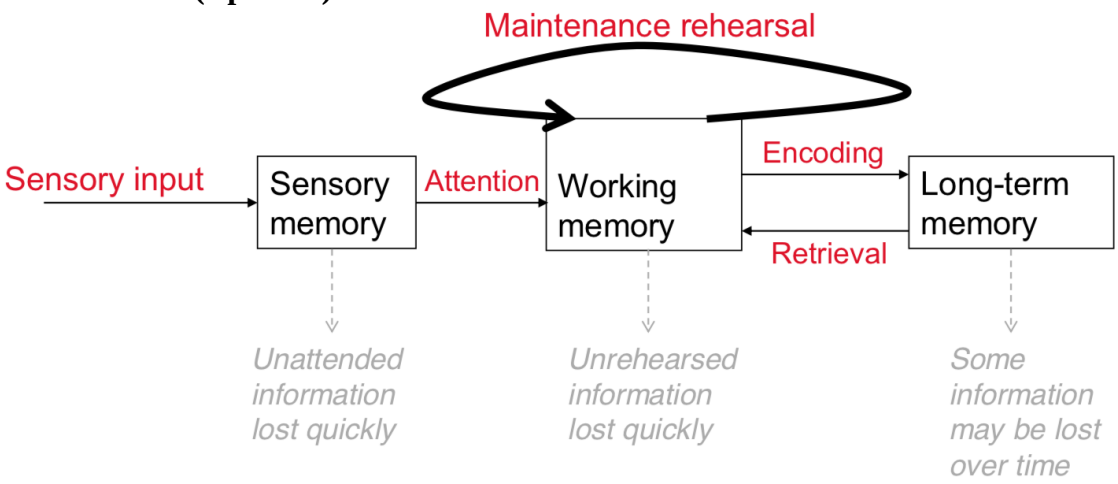
Problem with Atkinson & Shiffrin' Multi-Store Model

- Proposed probability of memory item → LTM inc. with time residing in STM
- However, simply holding memory item don't guarantee → LTM
- What matters if the PROCESSING item undergoes in STM

Modification of model

- Baddeley & Hitch (1974)
  - STM works on memory, not just hold it
  - STM = Working Memory (WM)
  - WM broken down into several components

Modal Model (Updated)



Sensory Memory

- Trace of entire sensory input
  - Auditory (can remember things within 3-4 s, especially with cocktail party effect – name called, asked to recall what was said earlier)
    - **Echoic memory:** 'What did I just say'
  - Visual (< 1s)
    - **Iconic memory (Sperling, 1960):** like a photo, but only available momentarily

S D P

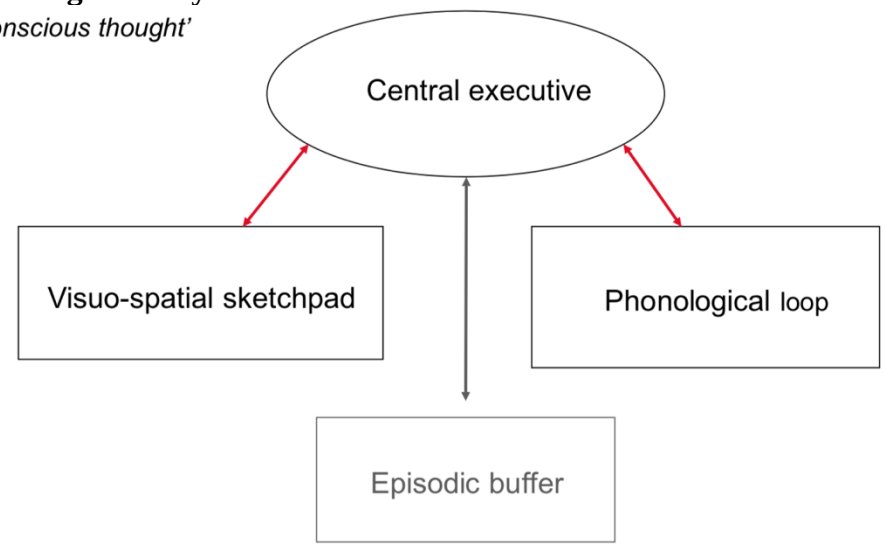
H L N

M W C

  - When shown very briefly and asked to recall, only 50% of letters reported
  - When played tone right after image disappeared to cue which row to report, could report very accurately
- Accessible even when not attending to input
- Have to ATTEND TO before → WM

Working Memory

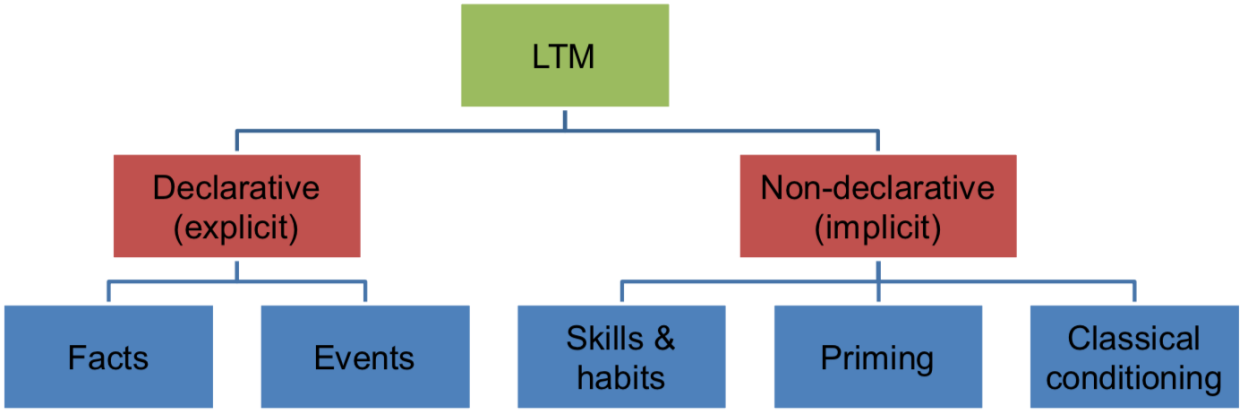
'Conscious thought'



- Central Executive: controls cognitive processes, directs focus and targets info (making WM and LTM work together)
- Visuospatial Sketchpad: drawing/visualizing things
- Episodic Buffer: system for integration of various systems related to one another (movie – visual, audio, plot, etc)
- Phonological Loop: auditory info

Long-Term Memory

- Stores everything we know
- Huge capacity
- Passive, not active
- Long duration



- Priming: a substance that prepares something for use or action (talking bout a farm and saying shit like cows, horses, hay, etc) ← this was hella poorly explained, look for it in the textbook

Nov 11, 2019

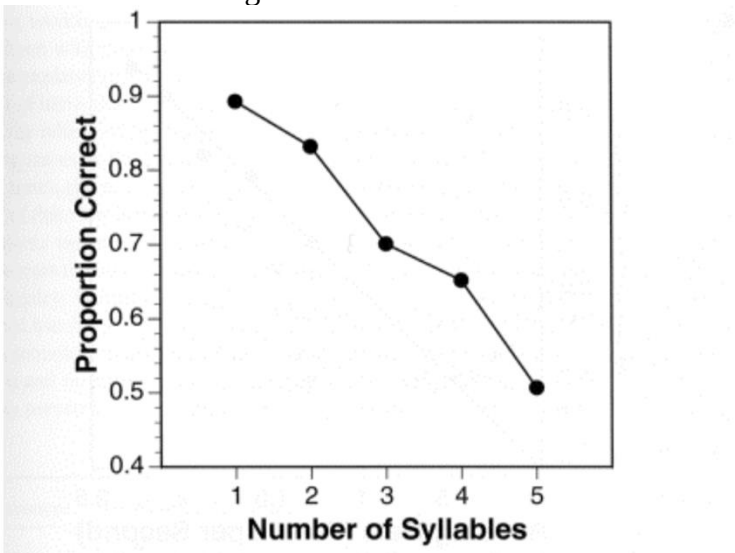
Psychology Lecture 15: Memory II

A closer look at WM: Phonological loop

- Repeating words in head/mumbling in working memory pattern
- Subvocal rehearsal occurring in memory

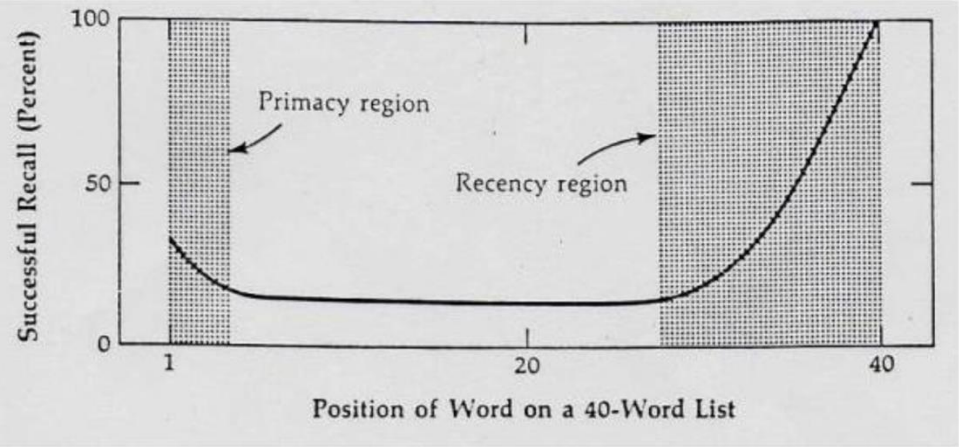
Evidenced for rehearsal: Phonological loop

- Brain areas active during verbal memory tasks are the same as those active during speech and listening



5.2 Proportion of words correctly recalled as a function of the number of syllables.
Baddeley, Thomson, & Buchanan (1975)

Serial Position Curve



LTM **WM**

Limited capacity of WM

- Limited by how many things we can hold in WM, but cando parallel processing of different modes
- For phonological items, 7 +/- 2 items
    - Digit span on IQ tests
        - Memory span depends on items, chunking → we organize them
- Without rehearsal, info can't be held in WM very long (max 15-30 seconds, depending on modality)

Visuo-spatial sketchpad

- Someone asks you for directions from campus to parliament buildings. Maybe they want to know what side of the street parliament will be on. What do you do (mentally) to give them directions?
- Map path in your head, imagine yourself taking path

Evidence for visuo-spatial sketchpad

- Damage to areas involved in visual abilities interferes with doing similar tasks in WM
    - Brain damage patient unable to identify objects by sight (difficulty answering questions requiring objects in WM)

Dual-task performance in WM

- Easier to do 2 things at once that don't use same component of WM
    - Visual + phonological > visual + visual
    - Remembering series of patterns on dominos doesn't affect remembering set of numbers
    - Provides strong evidence for different components of WM

Tips for strong memory

- Practice makes perfect
    - Practice while encoding

    - Practice retrieving
- Expand rehearsal
    - Disadvantage of summer course
- Organize it
    - Levels or processing, etc.

Organization

- Mnemonics
    - 'Never Eat Shredded Wheat'
- Visualization
    - Associate a vision with list of words
- Chunking
    - Long number → phone # divisions
- Hierarchies
    - Remember what you need to buy at the store by breaking it down: 3 dairy items, 7 fruits, 1 bread item, 2 cleaning items

Levels of Processing

- Orthographic (letter relationships)
- Phonetic (rhyme relationships)
- Semantic (meaning relationships)

More tips for strong memories (verbal + visual)

- Rework
    - Own words, talk about it with someone
- Method of loci
    - Link material to familiar place/route
- Imagery
    - Create image of what to remember (mind map)

Hippocampus & Memory

- Clive Wearing: amnesia but music bridged the gap
- H.M: hippocampus removed in 1953 (cure epilepsy) → memory problems
- Hippocampus
    - converts STM (WM) → LTM
    - Plays role in LTM, not STM
    - LTM not stored/accessed in hippocampus
    - Only for memory
    - Declarative/facts LTM formed here, not procedural/non-declarative/motor skills (cerebellum)

Memory happens in many places

- Distributed throughout

- LTP (long-term potential): synapses change as we learn, require less stimulation to fire again (change in sensitivity allowed by NTs and proteins)

Implications
- Declarative and non-declarative memories done by separate processes in brain
- Each brain area has own specialized function(s)
- Unaware of where LTM stored

Flashbulb memory
- Strong emotion = stronger memories when encoding
- Long-term stress can interfere with forming memories

Getting info out of LTM
- Recall vs recognition
    - Recall: report items previously studied
    - Recognition: select items previously studied
    - Recall harder; though recognition susceptible to false memory effects
- Retrieval cues & context effects
    - Memories formed as network
    - Retrieval easier if you cue memories of learning context
    - State-dependent learning: remember better where you learned (scuba divers, drugs)
- Moods
    - Depressed = remember sad memories
    - Happy = remember happy memories
    - Forms a cycle

Forgetting
- We forget a lot over life; we need to forget but can't choose what to forget
- **Encoding failure**
    - Not pay attention → memory not stored well
    - Distractions, irrelevant info
- **Storage decay**
    - Unused info lost; use it or lose it (forgetting eventually plateaus)
- **Retrieval failure**
    - Tip of the tongue phenomenon (if you can't remember, just forget → "learning" error-full state)
    - Retroactive interference: new info makes old info hard to remember (old postal code)
    - Proactive interference: old info makes new info hard to learn (drive automatic from stick shift)

Scripts
- Top-down structures used in memory of familiar events
    - Series of "slots" filled

Nov 16, 2019

Lecture 16: Motivation

Lecture Outline
- Theories of motivation
- Hunger

Defining motivation
- Motivation: need/desire that energizes + direct behaviour → goal
    - Necessary (physiological)
    - Desirable (cognitive)

Theories of motivation
- Instincts
- Drive reduction
- Optimal arousal
- Maslow's Hierarchy

1) Instincts
- Behaviour that's unlearned, complex, fixed throughout said species

Examples of instincts in non-human animals
- None (wasn't at class)

Examples of instincts in humans
- Rooting response
    - Newborns (< 6 weeks): rubbing cheek indicates which direction to turn for food since eyes aren't fully developed yet; suck when something is in their mouth
- Palmar grasp reflex
    - Object placed in infant's hand + palm of child is stroked → fingers close reflexively, and object is grasped

Instincts are adaptive
- N = 40 000
- Various cultures
- Rated disgustingness of images
- Images of objects holding potential disease rated as more disgusting

2) Drive reduction
- Drive: aroused state occurring because psychological need
- Need: lack/deprivation that energizes drive to reduce need
- *Goal of drive reduction is homeostasis*
- We aim to maintain homeostasis
    - Steady, balances internal state
- To do so, when need inc., reducing drive inc.

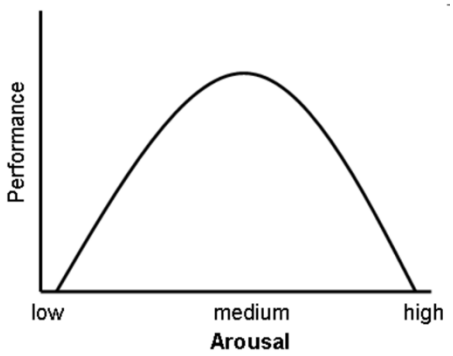
Model of drive reduction
- Need → Drive → Behaviour
- Sleep → Tired → Go to Sleep

Interaction with incentives
- Incentives: positive or negative stimuli that motivate behaviour
- **Need + incentive → strong drive → behaviour more likely**
- Sleep + comfy bed → really tired → go to sleep sooner
- Sleep + wet sleeping bag → not as tired → go to sleep later
- Food → hungry → eat
- Food + smell cookies → really hungry → eat lots/sooner

But…
- Drive reduction doesn't fully explain motivation either!
- People often act in ways that inc. rather than dec. drive

<u>3) Optimum arousal</u>
- We are motivated to reach an optimal state of alertness/activation (instead of seeking some biologically based balance)
    - i.e: toddlers explore

Yerkes-Dodson Law
- performance improves with physiological or mental arousal, but only up to a point

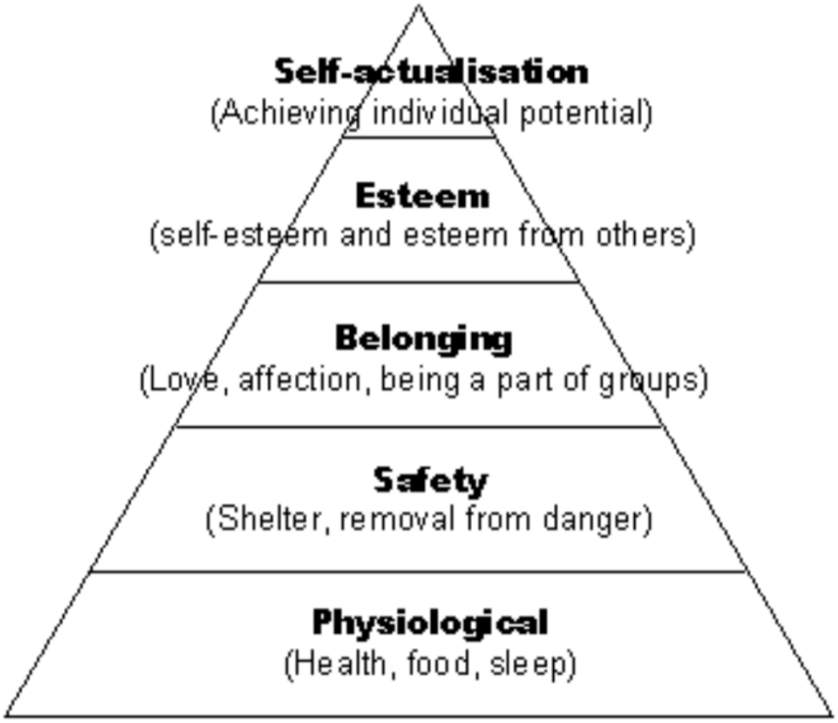


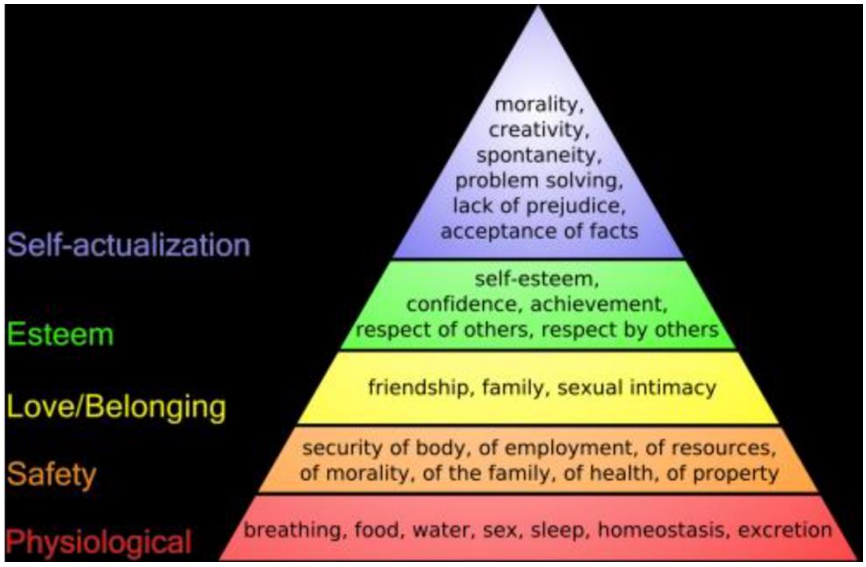
Eye-witness testimony application
- anxiety: unpleasant emotional state where we fear something bad happening
- induced by stressful situations
- typically accompanied by physiological arousal
    - **Q:** what system drive physiological arousal? **A:** autonomic nervous system
    - **Q:** Based of Y-D Law, when would we expect EWT to be most reliable?
      A: during medium level arousal

Risk-takers (sensation seeking)
- People differ in terms of the level of stimulation they enjoy and seek out
    - Gender- and age-related differences
    - Individual differences
        - i.e: base-jumping

4) Maslow's Hierarchy of Needs

- We fulfil bottom needs first





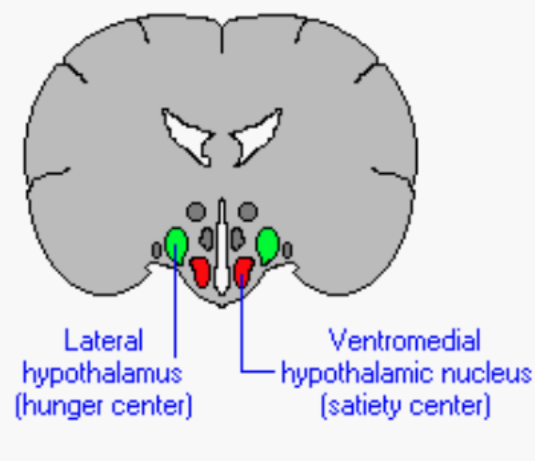
- We can overcome hierarchy
    - i.e: hunger strike
- interesting cross-cultural effects on subjective ratings of well-being
    - developing countries: financial satisfaction
    - wealthier countries: home-life satisfaction

Hunger

- Physiological consequences
  - Less active
  - Weight loss
- Psychological consequences
  - Obsessed with food
  - Lose interest in other activities
- Hunger triggered by physiological and psychological factors

Hunger Physiology

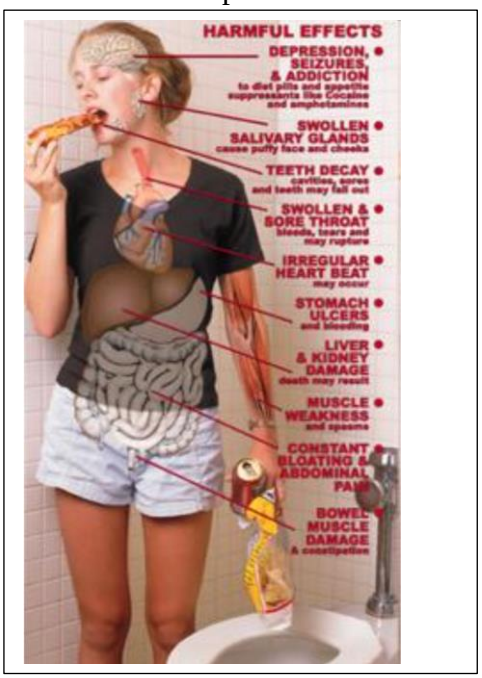
- Stomach
  - contractions correlate with hunger pangs
  - but this doesn't fully explain hunger
    - people with stomachs removed still get hungry
    - we can still feel hungry with a full stomach
- Brain
  - Hypothalamus: monitors levels of hunger hormones
  - Lateral hypothalamus: induces hunger
    - Destruction → stops eating
  - Ventromedial hypothalamus: inhibits hunger and eating
    - Destruction → overeating + fat production

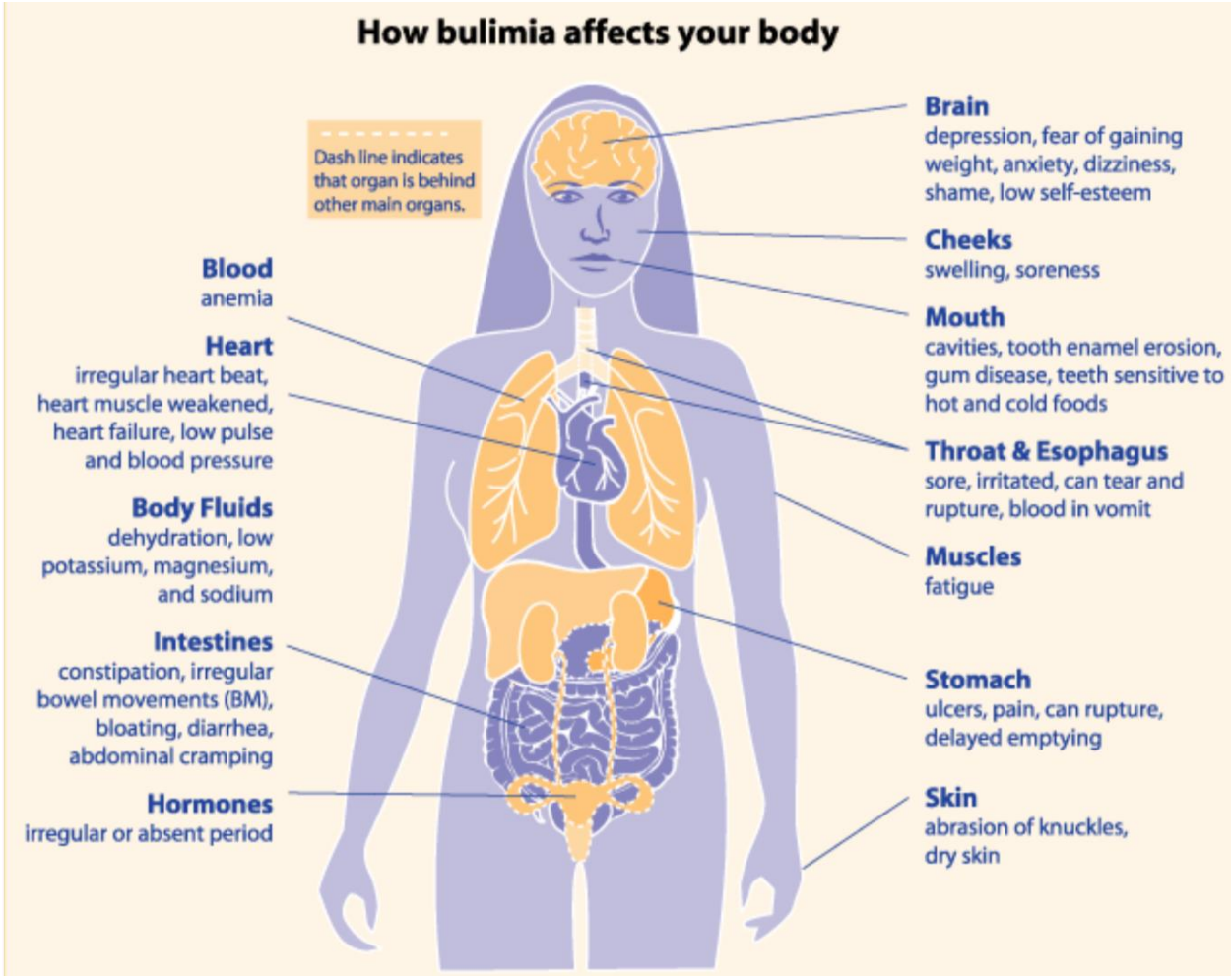


- Chemistry
  - Blood glucose: when low → hungry
    - Insulin: secreted by pancreas dec. glucose processing it
  - Orexin: released by lateral hypothalamus when glucose drops
    - Triggers hunger (rats eat tons when given it)
  - Ghrelin: secreted by empty stomach
    - Triggers hunger
  - Leptin: protein secreted by fat cells
    - Inhibits hunger, inc. metabolism
  - PYY: hormone in digestive tract
    - Inhibits hunger (temporarily)

Hunger Psychology

- Memory
  - Plays role in hunger/satiety
    - Amnesiacs will eat several meals because they don't remember recently eating
    - For most people, passage of time inc. expectation of eating
- Situational
  - How many people crave fries, chips, chocolate, candy when they're stressed?
  - Carbs inc. serotonin levels
    - Serotonin calms us
- Experience
  - wary of new foods
    - it is adaptive to be wary
  - learned taste aversions
  - cultural preferences
    - repeated exposure inc. appreciation for new food
    - exposure to novel foods inc. chances of trying other new foods
      - how can we explain this with other concepts we've learned in the course?
  - **<u>interaction of experience + situation</u>**
    - pregnant women develop strong taste aversions (and cravings)
      - tend to be strongest in 1st trimester, when fetus is most susceptible to damage from toxins
- Eating disorders
  - Bulimia nervosa
    - Binge and purge
      - Vomiting, laxatives, exercising, fasting
    - Tend towards anxiety and depression
    - Weight fluctuates around normal levels
  - Anorexia nervosa:
    - Excessive limitation of food intake
    - Distorted body image
    - 90% are females
    - Mostly teens
  - Explanations for eating disorders
    - Learned focus on weight, appearance from parents
    - Childhood obesity, low self-esteem (BN)
    - High-achieving, competitive families (AN)
    - Genetic links evolutionary selection
    - Cultural influences
      - Highest rates of ED in North America, where most cultural pressure exists to be thin and women have poor body image
      - Retouched ad shows her severely emaciated
      - She is really 5'10" and weighs 120 lbs
      - "They fired me because they said I was overweight and I couldn't fit in their clothes anymore"





Nov 20, 2019

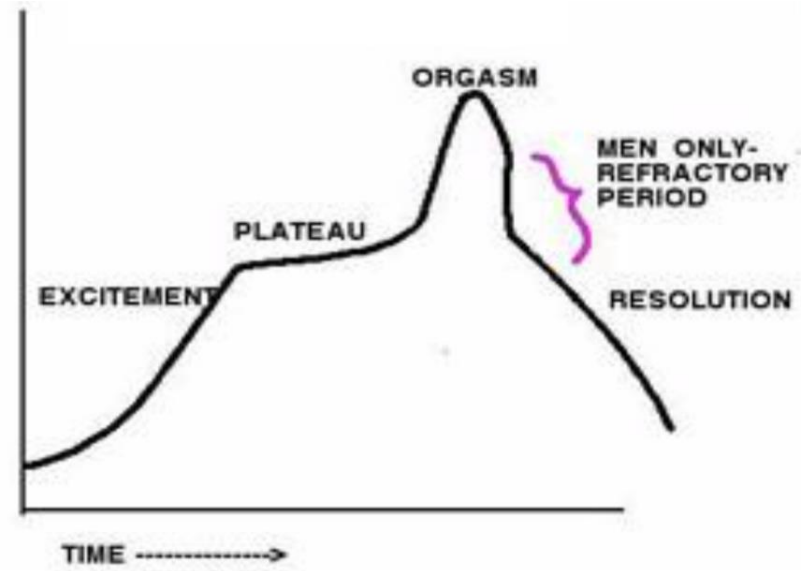
Lecture 17: Motivation II

Sexual Motivation

- Hunger is necessary for survival, sex isn't
- But they share several motivators
    - Physiological factors
    - Psychological factors
    - Cultural/experiential factors
- Sex allows survival of species
    - Sexual motivation encourages sex
- Kinsey Reports (mid-1900s)
    - Sexual behaviour in human male
    - Sexual behaviour in human female
    - Still doing research (Indiana University) (http://www.kinseyinstitute.org/)

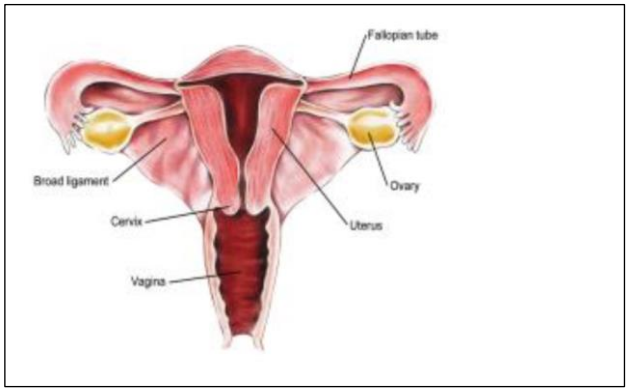
Sex Physiology

- Sexual response cycle (Masters & John son, 1966)
  - 4 stages
  - Similar in men and women



1) Excitement

- Genitals engorge with blood
- Vagina expands, secrete lubricant
- Breasts, nipples enlarge



2) Plateau

- Breathing, HR, BP, muscle tension continues to inc.
- Penis fully engorged
  - pre-ejaculation fluid common
- vaginal secretion continues inc., clitoris retracts

3) Orgasm

- muscle contractions throughout body
- continued inc. in breathing, HR, BP
- similar feeling for men and women
  - can't tell which gender is describing orgasm in written descriptions
  - PET scans show same subcortical brain areas active during orgasm in both sexes
- Female orgasm and conception
  - Vagina extends and narrows
    - May help draw sperm to uterus
  - Uterus contracts (similar to childbirth contractions)
    - Inc. retention of deposited sperm

4) Resolution

- Blood spreads away from genitals

- Refractory period
    - No orgasm possible
    - Shorter (or nonexistent) for females

Sexual disorders

- Motivational
    - Lack of sexual arousal energy
    - Lack of arousability
- Physiological
    - Premature ejaculation (men)
    - Erectile dysfunction (men)
    - Orgasmic disorder (women)

Sex hormones

- Early in development, these direct development of sex characteristics
- Later involved in sexual behaviours
- Estrogen ("female" hormone; peaks at ovulation – fertile segment of menstrual cycle)
- Testosterone ("male" hormone)

Mate choice

- Inc. sexual receptivity
- Women rate masculine men's faces as being more attractive at ovulation than at other times in cycle
- During fertile period, women judge body odours of men with symmetrical bodies (good genetic quality) as being attractive
- Non-human animals 'advertise' ovulation: conspicuous ovulation
    - Estradiol surges: change in body odour
    - Male competition is fierce; lots of sex during ovulation → typically becomes pregnant
- Humans don't advertise ovulation
    - Although they do show more skin, wear tighter skirts
- So, can men tell when it's worth having sex?

Singh & Bronstad, 2001

- women with regular menstrual cycles, not on pill
- wore a t-shirt for 3 nights during ovulation
- wore different t-shirt for 3 nights during non-ovulatory phase
- male raters smelled t-shirts, rated odour
- ovulation t-shirts rated as more sexy and pleasant than non-ovulatory t-shirts

Testosterone: "Male" hormone

- drives male sexual activity
    - castrated rats lose interest in sex
- but levels aren't as strongly implicated in behaviour as in women
    - i.e: not always necessarily cause and effect of sexual activity
- drives female sexual activity (> estrogen)

- low testosterone levels → low sex drive

Sex Psychology

- most people (men and women) become aroused when exposed to erotic material
  - measures include brain imagine and various body measures
- exposure to erotica can influence our judgement of
  - appropriate behaviour
  - typical/average attractiveness
  - sexual satisfaction

Sex Psychology: Internal Stimuli

- genital arousal typical during dreaming
  - even non-sexual dreams
- 95% have sexual fantasies at some point in life (men: more frequent, more physically based, less romantically-based)

Sexuality during adolescence

- Teen pregnancy rates in US > Europe

Factors that dec. chance of sexual activity

- High intelligence
- Religion
- Father present during child and teen years
- Community service

Factors inc. chance of teen pregnancy

- 1) Ignorance: don't know what birth control methods protect from pregnancy & STDs
  - Sex ed DOESN'T inc. chance having sex; might delay it, and does inc. intention to have safer sex
- 2) Embarrassed: don't talk to anyone, so remain uninformed
- 3) Guilt: if I feel guilty about sex, less likely to carry condoms. More likely to get pregnant if do have sex
- 4) Alcohol: less condom use, poorer judgment, less inhibition
- 5) Media: commonly portrays causal sex, rarely deals with safer sex

STDs

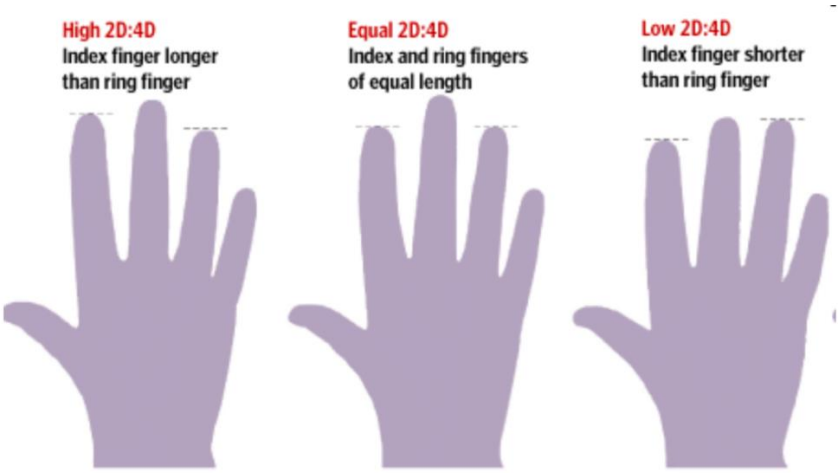
- 66% new infection in people under 25 (girls especially)
  - 40% of sexually active 14-19-year-old females in US have STD
- If you have sexual contact 30 times using a method that is 98% effective at preventing STDs (i.e: condom), your chance of contracting an STD at some point is about 50%

Sexual orientation

- Rates of homosexuality depend on method and population sampled, but range from about 2-10%
- Classified by APA as a psychiatric illness until 1973
- Becoming more accepted in culture, but homosexuals still suffer elevated rates of depression and suicide

Origins of homosexuality

- Not learned from modeling of homosexual parents or bad childhood experiences
- Fraternal birth-order effect
    - Cause: more older brothers of a man → more likely to be gay
- Functional and structural brain differences
    - Hard to tell which comes first, but some evidence for early (prenatal) effects
- Genetic links (twin studies)
    - Identical twins more like to have same sexual orientation than fraternal twins
- Biology outweighs experience; understanding this dec. discrimination against homosexuals



Nov 25, 2019

Lecture 18: Emotion

Why do we have emotions?

- They serve a purpose
    - Focus on attention on relevant info
    - Drive behaviour
    - Influence performance (Yerkes-Dodson law)
        - Enhance survival

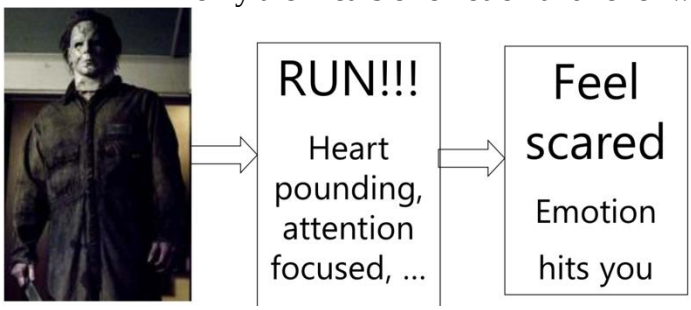
Components of emotion

- Physiological effects (physiology)
    - i.e: pounding heart, nausea, lack of energy

- Expressive behaviours (behaviour)
    - i.e: walking speed, facial expressions, tears
- Conscious experience (cognition)
    - i.e: thoughts, expectations, feelings

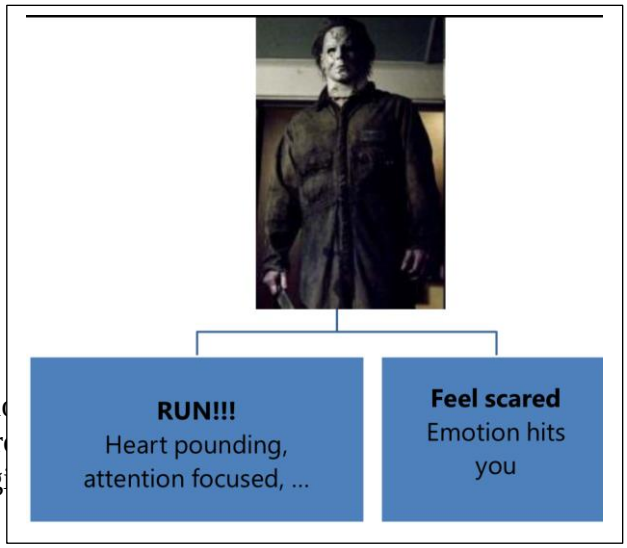
James-Lange Theory (1800s)

- Physiological effects precede conscious experience
- All emotions develop from (and can be reduced to) physiological reactions to stimuli
    - You swim and see a shark → swim quick to boat and climb in, heart pounding → only then fears of emotion and relief wash over you



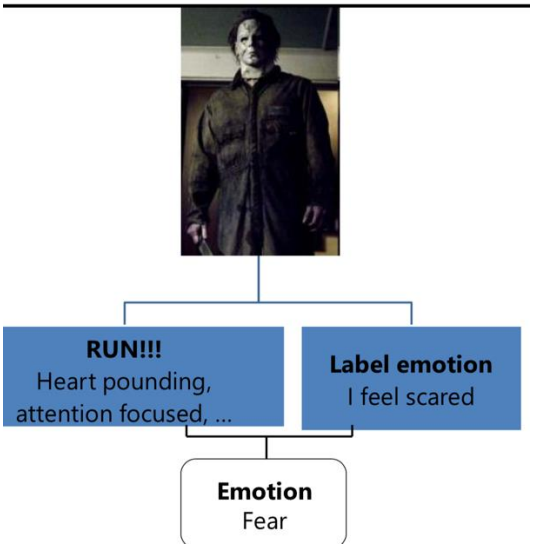
Cannon-Bard Theory

- Physiological arousal and emotional experience occur simultaneously
    - Physiological response isn't specific enough to drive emotion
        - i.e: heart pounds for anger, love, fear
- Stimulus triggering emotion sends message to
    - Cortex → subjective emotional response
    - Sympathetic NS → physiological response



Two-factor Theory

- Physiological and cognitive factors combine → emoti
    - Similar to J-L theory (emotional experience gr
    - Similar to C-B theory (emotions are physiolog interpretation of physiological response)



Emotion and ANS

Sympathetic (arousing)		Parasympathetic (calming)
Pupils dilate	**Eyes**	Pupils contract
Decreases	**Salivation**	Increases
Sweats	**Skin**	Sweat dries
Increases	**Breathing**	Decreases
Accelerates	**Heart**	Slows
Inhibited	**Digestion**	Activated
Secrete stress hormones	**Adrenal glands**	Hormone secretion decreases

12

Physiological emotional responses

- Similarities
  - Perspiration, HR, breathing similar for fear, anger, sexual arousal
- Differences
  - Brain activity

Brain correlates of emotion

- Amygdala: fear
- Right prefrontal cortex: disgust, sadness/depression
- Left prefrontal cortex: happy, positive moods
  - Linked to nucleus accumbens: active during pleasurable experiences

Cognition and Emotion
- Emotions affects thoughts, perceptions of our lives
- Thoughts affect emotions as well

Existing emotions influence subsequent emotions
- i.e: arousal from seeing your team win hockey game → anger in riot
- i.e: sadness from learning grandma died moderates happiness at finding out you made swim team
- Spillover effect: arousal response from one event spills over into our response to the next event

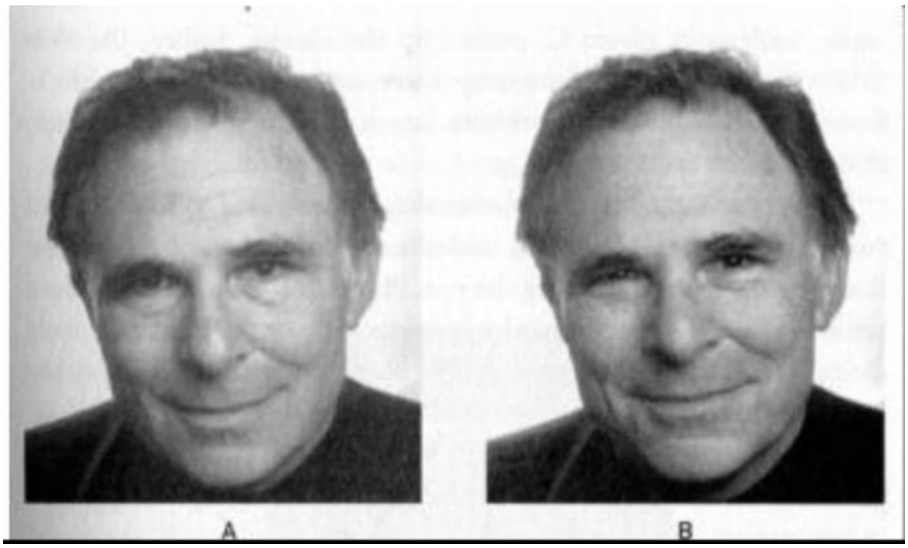
Emotion without/before cognition
- People who saw happy faces drank more juice than people who saw angrier faces flashed in front of them (word experiment; unaware of this emotional stimulus)

Fast and slow emotional routes
- Slow ('high road')
  - Sensory organ → thalamus → cortex → amygdala
- Fast ('low road')
  - Sensory organ → thalamus → amygdala
    - Amygdala activated by emotional stimuli even if we're unaware we've seen them
- Basic emotions (i.e: fear, likes) more likely to take 'low road' than more complex emotions (i.e: guilt, love) which heavily influenced by cognitive appraisals of situation

Non-verbal emotional expression
- We able to read express emotions using facial expressions, body language, voice analysis…
- Women > men
  - Emotional sensitivity
  - Emotional literacy
  - Emotional responsiveness (i.e: ads)
  - Empathetic displays

We know what emotions look like
- What would someone who is scared look like?
- What would someone who is happy look like?

Can we tell when emotions aren't sincere
- Not very well – chance levels
- But we can be taught to use cues and get better at detecting deceit



- True smile: B – eyes crinkly and more engaged

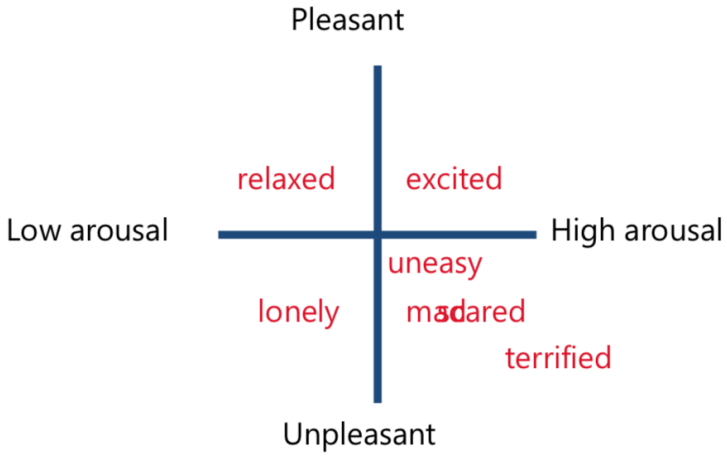
Emotional Expressions

Universality of emotional expressions

- Different cultures express emotions with same facial expression but differ in terms of how emotionally expressive they are
    - i.e: Japanese < American when in public

Expressions affect emotions

- Feeling blue? Smile!
    - Improves mood
    - Find comics funnier
    - Recall happier memories
- Engaging facial muscles influences mood
    - We feel sad when looking at sad pics, but sadder when asked to make eyebrows 'sad' form

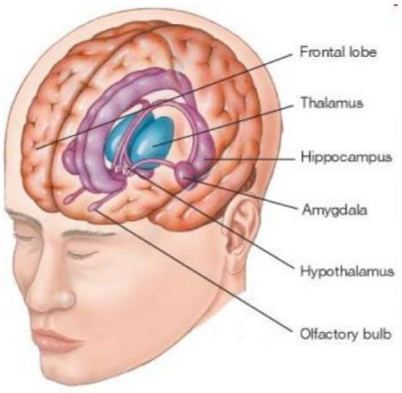


Fear

- Adaptive (good for species; no fear → injured more → die more; protects us)
- Genetic links
    - Identical twins' average fearfulness levels more similar than fraternal twins'
- Can be learned
    - Through experience
    - Through observation

Learning fear: amygdala

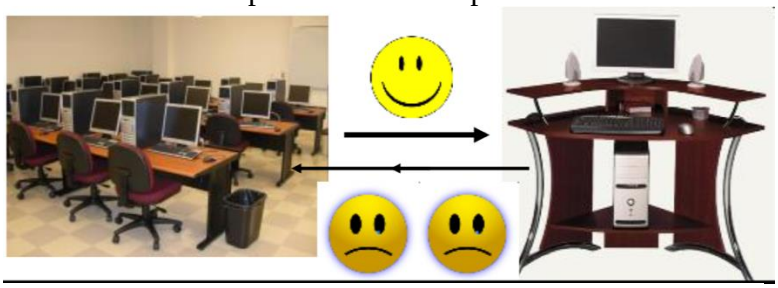
- If removed, animals do not learn to fear new stimuli
- If damaged in humans, can maintain memory of learning fear, but do not experience it
- Active when exposed to scary stimuli



Limbic system

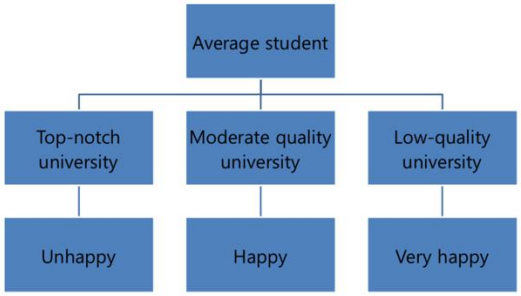
Happiness: Adaptation

- Our subjective judgements of happiness are influenced by both
    - Adaptation: recent experience influences reaction to events



Happiness: Comparison

University effect



Take-home message

- Emotions are complex and influenced by:
    - Environment/experience
    - Genetics/biology
    - Social/cultural factors

Sunday December 15, 9:30, Gym C or D