Week 1

02 December 2012
01:10

Empedocles of Acragas - **Cardiac hypothesis** - Heart gave rise to the mind
Alcamaeon of Croton (490-430 B.C.)Galen - Brain hypothesis - brain gave rise to the mind
Descartes - Dualism - Mind and body are separate entities that work together - believe the **pineal gland** was the bridge - only one in the brain
Franz Josef **Gall - phrenology - localization** of function
Wilder **Penfield - mapping the brain** - cortical ablation + electrical stimulus

Evolution of field psychology

Wilhelm **Wundt** - founder of psychology - **structuralism** - breaking consciousness down into elemental sensations and feelings - **introspection** - observing ones own experience
William **James** - Functionalism - the purpose of mental processes from an evolutionary perspective

Schools of thought

Gestalt: Perception based - we see things as a whole before seeing individual parts - revealed through the use of illusions

Freudian: The unconscious - operates outside on control but influences conscious thoughts, feelings and actions - believed there were 'toxic contents' that could manifest as a disorder - beginning of psychotherapy

Behaviourism: Skinner + Watson - believed the mind was a black box that could only be observed after death - had to learn about it via peoples actions and behaviours - stimuli and reinforcement (skinner box and 'little albert' experiment)

Cognitive: Fredrick Bartlett - false memories Piaget - errors of children Chomsky - learning language Miller - computer analogy - Brain:Mind ; Hardware:Software

Cognitive neuropsychology- how damage to different parts of the brain effects different cognitive functions (speech,attention, memory)

Broca and Tan - Left frontal lobe damage lead to broca's aphasia
H.M - removal of hippocampus lead to anterograde amnesia

Brain plasticity and recovery of function - **Phantom Limb** Syndrome: ability to feel limbs that are no longer there due to the brain **rewiring** the section associated with that limb - sensation of the limb can then be felt when other areas of the body are touched

Cognitive neuroscience - PET scanner - neurochemicals, blood flow. MRI scanner - structure

Methodology

Correlation study: Finding relationship between two variables but may not be causational **Cum hoc ergo propter hoc - third variable problem**
Experimentation: Variables -subject: cannot manipulate
independent: manipulating
dependant: measuring for change
Reliability - control group
Internal validity - making sure the independent variable is the cause of change
External validity - applications outside of experiment - variable are representative of the real world
Environmental validity - experiment mimics real life as much as possible
Practice effects - past trials mean patients tend to improve
Attrition - people drop out of studies
Power - the ability of an instrument to measure a specified condition
Demand characteristics - social pressure to answer questions in a particular way
Hawthorne effect - being watched changes peoples behaviour
Blind experiments - participants don't know what the study is about
Double-blind experiments - Experimenter doesn't know which group is under which conditions (e.g. drug trial) - this reduces bias to expected outcomes

Research ethics - week 2

< 1940's : No international legal code. Nazi experiments caused the **Nuremberg code** to be formed (1947):

- Informed consent - subject knows risks of participating in a study
- Benefits must outweigh the risk
- Freedom from coercion - subjects cannot be bribed or threatened to take the study
- Physical and mental pain must be avoided (including injury or death)
- Human research must be based on work on animals (e.g. drug trials)
- Deception may only be used when it is justified
- Debriefing - subjects must reveal the true nature of the study afterwards
- Confidentiality - personal information must not be released

Declaration of Helsinki 1964 : Funding was only given to researchers who complied with the code
Belmont report 1979: Respect for persons, benefits > risks, benefits of research must be shared

Ethics violation cases:

Tuskegee Syphilis study - Available medication was withheld from suffering patients. Violates: deception, physical and mental pain, benefits>risks
Witchita Jury case - Jury was recorded without knowing. Violates: consent, confidentiality
Milgram's Obedience study - Shock therapy - people continue to inflict pain because they were told to. Violates: Physical and mental pain
Zimbardo's Prison study - students took on roles of prisoners or guards. Violates: Physical and mental pain, benefits>risks
Bronchoscopy - accidental drug overdoes death. Violates: benefits>risks, physical and mental pain, informed consent
Restaurant letter study - employees lost jobs. Violates: physical and mental pain, informed consent, deception

Animal research

-Animal care committee must clear all research
-Acceptable if: Discomfort and stress are minimized
Benefits to humans and animals
Benefits could not be obtained via other methods (computers, cell cultures)
3 R's: **Reduction** (use less animals), **Refinement** (improve conditions, reducing pain)**, Replacement** (alternative methods)

Week 2

02 December 2012
18:12

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Week 3

02 December 2012
18:38

Statistics

Descriptive statistics: measure sample data -do not apply to the greater population

measures of central tendency - mean, median, mode, outliers (odd characteristics)
measures of variability - range, standard deviation (average difference between the measurements in a frequency distribution and the mean of that distr ibution)

Variable relationships - scatter plots - correlation - range from -1 to 1. The closer the correlation coefficient (r) is to 1 or -1, the stronger the correlation between two variables
Positive correlation: +1 e.g. Ice cream sales and temperature
Negative correlation: -1 e.g. temperature and heating bills

Inferential statistics: How sample data reflects greater population
Depends on: Number of people in the sample - bigger the sample, more likely it will reflect the general population
Between group differences - the bigger the different between the manipulation and control group, the stronger the effect of the independent variable
Variability within each group - High variability within each group reduces potential differences between groups

Genetic basis of variability

Variability - Nature (genetic inheritance)
Nurture (environmental influence) - usually nature and nurture interact to effect us

Evolutionary theory - Natural selection - reproductive success, adaptive traits vs deleterious traits, biological evolution, variation and competition

Alleles - variation of genes, genotypes and phenotypes (expressed genes) - dominant and recessive traits

Genetic influence on aging and death:

Hayflick number: limited number of cell divisions that can occur
Telomeres: end of gene sequence - falls off each replication - do not regenerate therefore cell dies when they are used up. May be heritable. Cancer can replace telomeres using enzymes.

Genetic influences with intelligence - identical twins - high correlation

Genetics disorders:

Down syndrome: linked to trisomy 21 - extra chromosome
physical effects: shorter, facial differences
cognitive abilities impaired - lower IQ
More likely to develop alzheimers

Huntington's disease: Impairment of chromosome 4
attacks brain - degenerative disease - basal ganglia destroyed
hereditary
abnormal movements - chorea- uncontrollable movements, athetosis - rithing limbs
Depression, mood swings
dementia- memory loss, language impairements

Phenylketonuria (PKU): Autosomal recessive disorder
cannot convert phenylalanine to tyrosine
if Phe builds up - can lead to brain impairment - mental retardation, seizures

Environmental effect on development:

Foetal alcohol syndrome: teratogen exposure - facial birth defects and cognition impairments - smaller brain, neurons in wrong place

Genie 'feral child': confined for 13 years because father thought she was mentally disabled - did not learn to speak - missed critical period for language development
eventually learned some speech but it was telegraphic - only a few words. Right side of brain was working more than the left side - wired differently

Malleability of intelligence in children with low ses - the types of resources children are exposed to can increase intelligence

Stress

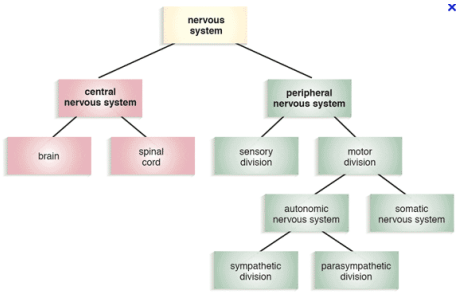
Internal stress, External stress (environmental), Positive (new house, marriage), Negative (losing job, breaking up)
Locus of control - ability to deal with stress

Responses: Physiological - breaking out, hair loss
Psychological - moody, losing sleep

Physiological response: **HPA axis** - understanding to responding: Hypothalamus --> pituitary gland --> adrenal gland
Short term - help draw on resources, respond to stress
Long term - immune system suffers, cardiovascular health - blood pressure
Psychological response - **Diathesis stress model** - schizophrenia, depression, bipolar, PTSD
genetic disposition needed and sufficient stress to induce condition

Week 4

03 December 2012
05:09



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Peripheral Nervous system: autonomic

Sympathetic division: Fight or flight - eyes dilate, increase heart rate
Catecholamines- Help body prepare. Released from adrenal glands - **epinephrine and norepinephrine**
Cortisol

Parasympathetic division: 'Rest and digest' - brings you back down from excited state

Somatic division: Voluntary- Efferent signal (motor) goes from brain --> body
Motor neurons connect to muscle fibers via acetylcholine - black widow venom increases (spasms)

Somatosensory division: Afferent signals (sensory) body --> brain
pressure - mechanoreceptors
Proprioception (proprioceptors) - knowing where your body is
Temperature - thermoreceptors
Pain - nociceptors - a delta fibres - fast to brain - reflex
c fibres - a slower reaction - causes throbbing pain

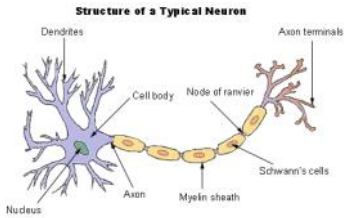
Spinal cord: Parts of the body correspond to different sections of the spine - dermatomes - **Top**: Cervical --> Thoracic --> Lumbar --> Sacral
Spinal impairments: **Scoliosis** - curvature, **Spina bifida** - incomplete closure of neural tube

Abnormal reflexes: **Babinski** Sign - finger down foot - should press out - if damaged, adults **will curl up** (like babies) - caused by damage to the frontal lobes - motor control
Snouting reflex - touch lip - they snout out if there is frontal lobe damage (reflex usually disappears as a baby)

Glial cells - glue that holds brain together
Astrocytes - Guide development. Support the blood brain barrier. Stop repair of brain injury - prevent re-wiring. Astrocytoma - brain tumour
Schwann cells - Speed neurotransmissions - insulate signal in PNS
Oligodendrocytes - Speed neurotransmissions - in CNS
Microglia - Clean up dead cells - minimize damage

Types of neurons

	Sensory neuron	Interneuron	Motor Neuron
Length of Fibers	Long dendrites and short axon	Short dendrites and short or long anxon	Short dendrites and long axons
Location	Cell body and dendrite are outside of the spinal cord; the cell body is located in a dorsal root ganglion	Entirely within the spinal cord or CNS	Dendrites and the cell body are located in the spinal cord; the axon is outside of the spinal cord
Function	Conduct impulse to the spinal cord	Interconnect the sensory neuron with appropriate motor neuron	Conduct impulse to an effector (muscle or gland)



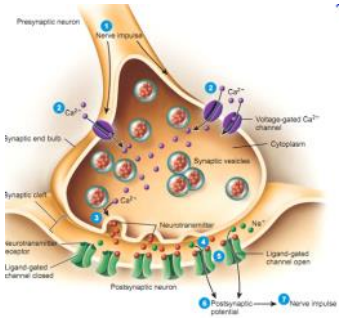
Cell body - nucleus, DNA
Dendrites - Receive information
Axon hillock - determines if neuron is stimulated enough to send a signal
Axon - travels away from cell body with signal
Myelin Sheath - insulator
Nodes of Ranvier - Space between myelin Sheath
Terminal - signal is sent to another neuron

Electrical transmission

- Negative resting potential inside neurons
- When a signal is received, the neuron becomes temporarily positive
- Must reach **threshold potential** before a signal is sent - all or nothing principle
- Action potential - signal that travels along axis to the synapse - via **saltatory conduction**
- **Depolarization** (sodium ions flood in - peak is always the same) --> **Repolarization** (returns to negative) -->
- **Hyperpolarization** (becomes slightly more negative than usual) --> Resting potential
- **Refractory period** - an action potential cannot be generated
- More signals = stronger sensation e.g. pain, colour

Multiple sclerosis - Progressive damage to the myelin - degrades neuron signals - effects immune system

Chemical transmission



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Electronic signal (AP) reaches terminal buttons
Calcium floods the terminal to move **vesicles to membrane**
Vesicles release neurotransmitter into the synaptic cleft
NT moves across the cleft to the post-synaptic neuron
NT binds with receptor - change in membrane potential - EPSP - Excitatory post-synaptic potential - depends on function of the NT
IPSP - Inhibitory post-synaptic potential
NT falls off receptor once it has had an effect
NT is either re-uptaken or deactivated by enzymes

Neurotransmitters

Glutamate - primary excitatory NT - learning and memory
GABA - Primary inhibitory NT - depressants stimulates GABA e.g. alcohol

Acetylcholine - voluntary motor control, attention, memory, **Alzheimer's**
Dopamine- regulates motor behaviour (heart rate...), motivation, working memory. High levels - **Schizophrenia.** Low levels - **Parkinson's**

Norepinephrine - mood, arousal.
Serotonin - Mood - regulation of sleep, aggressive behaviour

Agonists - increase effect of NT's, Antagonists - reduce effect of NT's

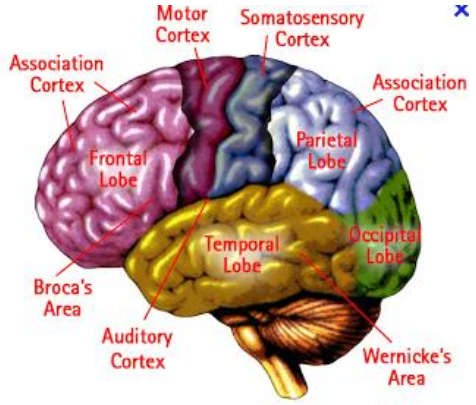
Week 5

04 December 2012
19:01

Brain structure and function

Cortex - outside of brain - Gyrus, 'bulge', Sulcus, 'groove', fissures - deep sulci

Cerebral cortex - 2 hemispheres (control opposite sides of the body, connected by the Corpus callosum), 4 lobes



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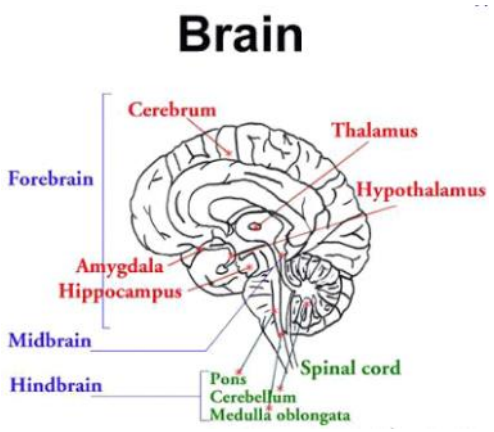
Frontal lobe: Production of speech, movement, high order functions
Parietal lobe: Attention, touch sensors, processing
Occipital lobe: Vision and processing - being in the back it is less likely to be damaged
Temporal lobe: Hearing, language comprehension (Wernicke's area), memory

Motor cortex: Dominated by face and hand areas
Somatosensory cortex: Also dominated by face and hands

Brain mapping can change over time

Grey matter - cell bodies - around edge of brain
White matter - axons
Basal ganglia - wrap around thalamus - essential for movement



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Forebrain:

Thalamus - Filters sensory information (except smell) and transmits it to the cerebral cortex
Hypothalamus - Regulates body temperature, and basic needs
Pituitary gland - Controls other glands, releases hormones - stress, reproductive processes, oxytocin
Amygdala - Emotional processing - especially negative emotions
Corpus Callosum

Midbrain:

Tectum-localizing information - orientation
Tegmentum- Production of dopamine to support movement, arousal

Hindbrain: coordinates information coming in and out of the spinal cord

Cerebellum - controls fine motor skills - impaired by alcohol
Brainstem - Pons - relays information from the cerebellum to the rest of the brain
Medulla - coordinates heart rate, circulation, respiration
Reticular formation - neurons in medulla - regulate sleep, arousal

Brain injury

Stroke: problem with blood supply. Site of stroke effects type of impairment
Ischemic - blocked blood vessel **Thrombotic-** build up of fat
Embolic- sudden blockage
Haemorrhagic - Bleeding occurs inside or around brain tissue - high BP, trauma

Traumatic Brain Injury - caused by falls, car crashes, assult
acceleratioin/deceleration - 2 points of damage

Skull fractures - swelling, infection
Focal injuries - contusions (bruises), bleeding (neurons die)
Diffuse injuries- axonal injuries
Concussion - compression and stress of important axons needed for consciousness

Phineas Gage: Damage to the frontal lobes - changed personality - emotions were heated

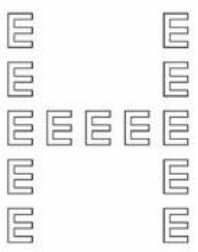
Week 11 Notes

13 November 2012
00:17

Hemispheric specialization

The left hemisphere processes information differently to the right hemisphere

Process	Right	Left
Voluntary motor control	Controls left side	Controls right side
Visual processing	Left side of space	Right side of space
Perceptual processing	Global - bigger picture	Local - details
Spatial attention	Right and left sides of space	Right side of space only
Lateralization of hippocampus	Visual memory	Learning verbal information



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Perceptual processing
Right brain sees H
Left brain sees E's

Right hemispheric damage - has an effect on language - someone can listen to a story and follow along, but when asked, for example "major themes" aka, the bigger picture, they are not able to summarize the information or see a larger context

seizures and EEG

* abnormal excessive or synchronous neuronal activity in the brain (e.g. epilepsy)
* the brain usually relies on controlled brain patterns
* Big spikes on an EEG indicate a seizure
* seizures can travel from one hemisphere to the other

Medication

* **GABA increase** - depresses brain activity - can be very effective or not at all
* Temporal lobectomy - By removing the part of the brain where the seizure originates you can prevent further damage - has consequences and cause loss of other cognitive functions

Corpus Callosum

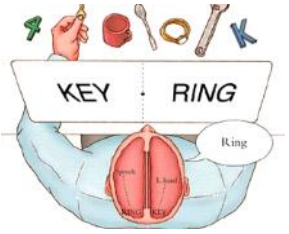
* The band of white matter (nerve fibres) that connects the right and left hemisphere - how seizures switch sides of the brain
* Cutting the corpus callosum can limit the seizure to one side of the brain SPLIT BRAIN PROCEDURE
* Cutting the whole corpus callosum leaves a person with essentially two brains as the left and right hemisphere cannot exchange information
* Cutting the front of the corpus callosum can stop a seizure - cutting the part that transfers motor information - fits limited to one side of the body - minimize damage
* **Agenesis** - Being born without the corpus callosum - leads to impaired intelligence and other complications - cutting does not have this effect

Alien hand syndrome: Hand has a mind of its own - usually the left - hand acts violently and inappropriately

Depression - The left side of the brain is underactive while the right side is overactive

Week 12

***Tachistoscopic presentation:** flashing split brain patients with an image in the right and left visual space very quickly. This results in each side of the brain only knowing one piece of information.



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*The left side of the brain (language specialized) will allow the person to verbally describe the image in the right visual s pace. The right side of the brain can imagine the image in the left visual space and identify the object by touch, but cannot verbally describe it.

*Left brain interpreter: The left hemisphere will try to rationalized the actions of the right brain. It can also do this by using the environment - if the left hand draws what the right brain is visualizing, the left brain can work out what it saw.

*Post callosotomy spatial performance: Right brain is more spatially orientated and therefore the left hand can perform tasks better than the right hand

***Ideomotor apraxia**: When the parietal lobe is damaged, a person can lose the ability to use tools. When asked to mime the use of a tool, patie nts will essentially become the tool as apposed to having the tool as a separate entity.

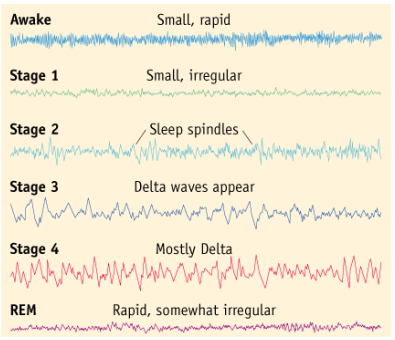
* Patients usually lose the ability to use a tool with their left hand because tool knowledge is stored in the left side of t he brain and when the corpus callosum is cut, information cannot transfer the right hemisphere, which controls the left hand

Basis of sleep- Everybody needs sleep - lack of sleep can effect emotions and cause hallucinations - interesting, sleep deprived people can often still function i.e. play games

Circadian rhythm: Naturally occurring 24 hour cycle - sleep is one section

Brainwaves and 5 stages of sleep

Stage	Brain wave type	Characteristics
Awake	Beta waves	High frequency
Drowsy/Relaxed	Alpha waves	Lower frequency
Stage 1 Sleep	Theta waves	Head jerks Don't realise you are falling asleep
Stage 2 Sleep	Sleep spindles K complexes - short bursts of activity	Help keep you asleep and supress consciousness on awakening - tend to be slightly disorientated but not moody more likely to roll around
Stage 3/4 Sleep Deep sleep	Delta waves	Big waves: s3 < 50% , s4 > 50% on awakening - tend to be very disorientated and moody
REM sleep	Sawtooth waves	Resembles awake pattern fast + random (rapid) eye movement increase heart and breathing rate



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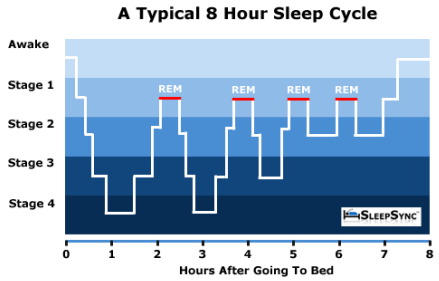
In an average night, a person will go through each stage of sleep several times. The amount of time spent in REM sleep increa ses during the night whereas the amount of time spent in deep sleep decreases. REM sleep has been linked to **memory consolidation** and deep sleep is important for promoting body repair and regulation - **growth hormone** is released during deep sleep.



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Sleep derivation

Effects: Attention, learning, memory (cramming for tests is not useful). Performance decrease in frontal, parietal and tempo ral lobes

Emotional regulation - People are usually emotionally more negative when sleep deprived - the **amygdala** is very active meaning emotions are heightened and the regions that usually control emotions shut down, therefore people are more likely to snap and be moody.

Sleep disorders

Insomnia - difficulty in falling or staying asleep - can be induced by stress or anxiety, the desire to fall asleep (sensitivities heightened)

Sleep apnea - temporary halt of breathing whilst sleeping - cause by obstruction - obese people at greater risk - sufferers usually snore

Narcolepsy - waves of sleep that hit whilst being awake - uncontrollable - feinting goats - when they become excited or scared the switch in their brain that controls motor control shuts off, causing a frozen state, or like sleeping. Can be treated with medication

Kleine - Levin (Sleeping Beauty) Syndrome : Rare disease which causes sufferers to sleep for long periods of time. Could be an autoimm une disease.

Somnambulism: Sleepwalking - common in children - usually occurs at the beginning of the sleep cycle in slow wave sleep (delta).

Sleep paralysis: waking up unable to move - occurs in hypnagogic(towards sleep) or hypnopompic (from sleep) sleep
Night terrors: abrupt awakenings with panic and intense emotion - most common in boys 3-7. Dreams cannot be recalled.

Dreaming

Characteristics:
Vividness: senses and emotions are heightened
Illogical: sense of time, place and people are warped
Uncritical acceptance: when dreaming, all events seem logical and we don't recognise them as being weird
Difficulty remembering: Dreams fade very quickly

Day residue - real life events bleed into dreams

Freud and the unconscious: the manifest content (surface meaning) hides latent meaning (underlying meaning). Believed dreams are an outlet for 'taboo' or dark thoughts. Problematic because there are infinite interpretations.

Dreams around the world: People across the world tend to believe that dreams have deeper meaning over other theories

Activation-Synthesis model: when the brain tries to interpret random neural activity - images can appear in dreams when neurons representing certain concepts and ideas are activated

Memory Consolidation: Dreams can replay certain information and could help with the transfer to long term memory

Week 13 notes

Language and communication

wada test: put half the brain to sleep - if left side of brain is asleep the patient can still talk, meaning the right side of the brain is important for language

Eloquent cortex - regions that control movement or language

Left hemisphere - different lobes work together to understand language

Left frontal lobes - producing language - vocalising or signing
Left temporal lobes -understanding and interpreting language

Condition	Damaged area	Symptoms	Effects	Treatment
Broca's Aphasia	Left frontal lobe Broca's region Insula	Mild - stutter Severe- can't produce speech, functionally mute, agrammatism (content words) flat prosody (monotone) Use content morphemes	Ability to learn, pay attention Mood - frustrated Can still understand language	Intonation therapy - singing the words - uses undamaged right broca's area
Wernicke's Aphasia	Left temporal lobe	Talking gibberish Prosody and ability to talk is in tact	Cannot comprehend language - makes sense in their head	If it doesn't clear up, not much you can do
Paraphasias		Producing words that don't exist Phonemic - sound mistake Semantic - meaning mistake	Ability to communicate	-
Conduction Aphasia	Arcuate Fasiciculus (White matter) connects broca's with wernicke's region	Cannot parrot speech - understands speech but cannot translate into sound	Patients can still function relatively normally	-
Global Aphasia	Left hemisphere	Cannot speak or understand language Major artery that supplies left side is blocked/damaged	Major language problems	

Right hemisphere damage : Patients can still understand and produce speech, but have problems with more complex aspects : cannot recognise sarcasm, can't understand underlying meanings (progmatics), discourse processing - cannot summarize information

Aspects of language:

Displacement: We can talk about things that aren't currently present
Arbitrariness: Words or gestures can take on any meaning that a population agrees on
Productivity: We have a word bank we can draw from to create infinite sentences - don't have to learn each sentence
Learnability: Any baby can learn any language they are exposed to.

Non humans can learn the meaning of basic words and sentences, but lack the ability to generate new sentences and thoughts e.g. kanzi the ape

Core components of language:

Phonemes: The smallest unit of recognisable speech - follow phonological rules
Morphemes: Smallest meaning units of language.

Content morphemes: nouns - cat,dog
Functional morphemes: grammatical - and, but
bound morphemes: must be attached to other morphemes - 'un' in unbreakable
free morphemes: Can stand alone - 'break' in un breakable

Semantics - the meaning of sentences - whether something is meant to be taken literally or the true meaning is implied. Context is important

Surface structure: How a sentence is worded
Deep structure: The meaning of a sentence - a sentence can have different surface structures but the same deep structure

Pragmatics - indirect speech - speaking to someone when the speech is meant for someone else 'SOME people'
metaphors
Sarcasm

Language processing:

Auditory: Filtering, linking sound to meaning, predicting speech
Visual: sounding words out, 'grabbing' whole words, linking percept to meaning, garden path sentence

Logical and moral decision making:

Rational choice theory - making decisions based on expected value - likelihood of something happening x the value of the event

How to make good decisions - having complete information, using an algorithm

Irrational reality: 'mental shortcuts' , **heuristics**

Using frequency is easier to make a decision with than using probability- more accurate
Availability bias - items more readily available in the memory are judged to occur more frequently - easier to call to mind e.g plane crashes over car crashes
Conjunction fallacy: thinking two events are more likely to occur together than separately $p(x \text{ AND } y) < p(x \text{ OR } y)$
Representative heuristics: making a probability judgment by comparing an object or event to a prototype of the object or event e.g. 70 engineers and 30 lawyers
Gambler fallacy: Thinking events are linked when they are in fact independent

Framing effects: Phrasing of statements can cause people to react in different ways e.g. positive and negative when asking patients to take a drug trial
Sunk-cost fallacy: Deciding what to do in the future based on past investment - relationships, business

Psyc tutorial - exam prep

28 November 2012
00:01

Re-visit midterms
notice the kind of material you struggled with on the midterm
separating which is important vs. what is not
knowing the implications of the studies presented in class

compare and contrast - brain regions …

e.g. wernicke's aphasia and broca's aphasia

highlight weaknesses

3 processes/stages of memory - encoding, storage, retreival
vestibular system - gives you information about your direction of movement in the absence of vision
GABA and Glutamate - primary excitatory and inhibitory transmitters
John D Watson
binocular disparity
all or none principle
akinetopsia
mirror neurons theory - biological basis of observational learning
inferential statistics
Nuremburg code
extinction
huntingtons
spontaneous recovery - reappearance of an extinguished response in classical conditioning
Sodium channels - open when neuron is depolarized

4 types of glial cells

astrocytes - developing nervous system
Swann cells

Questions for Souza

50 questions/ 100 mins
Chapter 5 and 9 - all, even bits not covered in lecture

- neglect - inability to attend to the left side of space due to damage to the right hemisphere's attention system (not peripheral, not just sight) - several lobes responsible

damage to eye - sensory
damage to occipital nerve - perception
damage to right hemisphere - attention

phobias - exposure therapy
TBI - 2 most easily damaged areas: frontal and temporal lobe - interior of skull set up like that

fixed vs variable interval- perfectly predictable or the time intervals change slightly
variable ratio - response based (slot machines) - most addictive - hardest extinction

Chomsky - humans have language acquisition factor - non humans do not have this

sleepwalking - 'awake' but not aware

gestalt - we see things as a whole, then segment