LEC 1 PSYC 1101

Psychology:

Psyche:

Is the mind physical or non-psychical?

Like any other science, we must define, observe, and measure/quantify our variables in psychology.

What are mental processes?

Mental processes cannot be physically observed however they can be inferred.

Myers definition of psyc. is mental processes and behaviour.

BEHAVIOUR:

- Observable
- Defined
- Measurable

Experiments in psych:

- in a true experiment we manipulate variables
- this might cause another variable being measured to change

Major divisions:

- experimental
- clinical: psychotherapy
- applied

Historical roots

Began in mid to late 1800s

As a branch of physics: psychophysics

First psych lab: Wilhelm Wundt in Leipzig, Germany

Structuralism: developed by Edward titchener in the US

Basic structures of the mind are analogous to the basic elements of chemistry

He used a method called introspection

Participant has to self-reflect on the contents of their consciousness

Proved to be highly unreliable and subjective

Function of mental processes?

Functionalism (pragmatism)

Developed by William James in the US

He did not perform experimental research

Questioned what the function of our thoughts and emotions is!

He developed several theories about consciousness memory and attention

Wrote the first book on psychology

Study of functions proved to be highly subjective

MAJOR DIVISIONS) CLINICAL)

- counselling psych
- S. Freud is generally considered to be founder of psych
- Major roots and therapy are recent perhaps in the late 1940s in the us. Due to a large amount of soldiers returning from the war with possibly PTSD
- 1st clinical psych dept. in Canada in Ottawa u
- Now the major field in psych

APPLIED:

- Apply knowledge of basic, fundamental experimental psych
- Social development

SCHOOLS OF PSYCH:

- Cognitive
- Biological/neuroscience
- Behavioural
- Social
- Psychoanalytical
- Phenomenological

COGNITIVE:

- Major branch in psych

- Study of higher mental functions
- Consciousness, memory, attention. Decision making, language
- In experiments you have to ask what behaviours you are directly observing
- Lexical processing is inferred not observed
- Hypothetical mental states of info processing
- Based on current response behaviour patterns/performance
- These mental states cannot be observed directly, only inferred
- Inference must be based on the basis of performance (RT and accuracy).. why rt is slower sometimes and faster other times
- Fell into dispute because it was thought to be unscientific
- Revival of division in 1950s

BIOLOGICAL:

- Bio psychologists attempt to measure actual mental events by monitoring brain activity.
- Either: manipulate psychological state/mental events (attention, memory..) and observe, see the effect of this manipulation on brain activity, brain structure.
- Manipulate brain (stimulate (electrodes, pms), lesion, drugs) and determine effect on psychology/mental events
- Stimulation comes from sending active potential such electrodes or using devices such as pms
- Or manipulate psychological states (attention, decision making, memory, emotions, motivation drivers) and see effect of this manipulation on brain activity, brain structure.

SUB-DIVISIONS of cognitive: review

9/15/2016

BEHAVIOURAL:

- Began in 1920's- Jim Watson critiqued cognitive psychology and psychoanalysis
- BF skinner created much of the tenets of behaviourism
- Behaviourism dominated psychology 1930s and above
- Psychology as an objective science
- Psychological events must be directly observable
- Only behaviour can be observed
- What is the motivation/drive for our actions?
- All behaviour can be explained by consequences of behaviour
- Reinforced behaviour tends to repeat itself (reward system)
- Similarly behaviour that is not reinforced is not repeated
- Strict environmental explanation of behaviour
- All behaviour is learned
- A criminal has a past of reinforced criminal behaviour
- No need to consider genetic influence

- No need for inference
- Deterministic: all behaviour is determined by consequential events (reinforcement or punishment)
- To correct inappropriate behaviour learned through incorrect reinforcement you will have to re-learn it correctly

SOCIAL:

- Study of social environment and its effects
- Social attitudes; social learning

EVOLUTIONARY:

- Social-biology (ethology)
- Most of human behaviour is explained through evolutionary/genetic principles
- Selection of traits that enable survival (natural selection)
- What enables species to survive and understanding the individual genes
- Emphasis on the study of animal behaviour (ethology)
- Deterministic theory
- Our behaviour and actions are driven by certain motives
- E.O. Wilson; Richard Dawkins (1975-present)

PSYCHOANALYTIC/PSYCHODYNAMIC:

- S. Freud (late 19^{th})
- Role of unconscious mind in behaviour
- Much of our behaviour is repressed
- It is these repressed, unconscious influences that dictate our behaviour and personality
- Deterministic: behaviour is determined by unconscious drives
- Criticized as being unscientific
- How can we prove this? Unconscious mind and repressed memories
- Psychoanalyst: trained psychoanalysis
- Emphasis on Freudian theory
- May or not be a psychiatrist
- Psychiatrist: residency in MD psychiatry. Must have MD
- Psychiatrists employ a medical model
- Psychiatric disorders are a mental illness. Treatment methods can include psychotherapy and drug therapy
- In Canada, only psychiatrists can prescribe medication

CLINICAL PSYCHOLOGIST:

- In Canada must have research degree , a Ph.D.
- In trained both research and clinical psych
- In some US regions a D.Ps will suffice

- Emphasis on abnormal behaviour
- Emphasis on change through counselling/psychotherapy

EXPERIMENTAL:

- Not trained in clinical psych
- Legally cannot perform or counselling or psychotherapy
- Cannot claim to be psychologists
- Trained as research, degree in Ph.D.

PHENOMENLOGICAL/HUMANISTIC:

- Humanistic theories: emphasis on unique human behaviour
- Concerned with individuals unique personal experience, their phenomenology (personal experiences in your life)
- Focus on subjective experience
- Concern with developing theories of inner life rather than explaining behaviour
- Criticized as being unscientific

SCIENTIFIC METHODS

- Epistemology (methods of obtaining of knowledge)
- Raphael The School of Athens (c.1509-1510) Vatican City
- BIG Research issues (according Myers)
- Stability vs. change
- Rationality vs. irrationality
- Nature vs. nurture
- Divine (non-physical) insight—Fra Angelica
- Pure logic and thought (Aristotle)—Lorenzo lotto “young man in his study” (1528) venice
- Scientific manipulation—red, blue, yellow; P Mondrian (1921)
- To obtain sensible logic, your facts must be correct

Idealism vs. materialism:

- Is everything that exists material in form?
- Laws of physical universe
- Psychology concepts? Love hate liberty free will the mind—conscious and unconsciousness

SCIENTIFIC PROCESSES

- What is the problem?
- Variables: what is it that changes and why
- Ex men are more physically violent than women. Why?

THEORY 2:

- Literature search and a summary/synthesis of what is already known
- Opinion or speculation?
- Different theories. controversy
- Testosterone is associated with aggression; men have more testosterone than women therefore it is possible that this is why men are more aggressive than women
- Social learning/modelling—gender roles set by society

Theories and hypothesis

- Hypothesis: theory based on synthesis of previous facts which makes a testable prediction called an hypothesis
- If testosterone is responsible for aggression then manipulating it must change levels of aggression

Scientific processes

- Before a theory is tested, the variables must be defined
- Define aggression: men are more physically aggressive women are more verbally aggressive
- Measurement or quantification of variables
- Define the study.
- Run the study
- Analyze the results.
- Interpret the results. Is the hypothesis supported?

Measures of central tendency (p13)

- Mode is the score that occurs most often
- Mean is average of all scores
- Medians is the scare at which half the people score above and half the people score below
- In a perfect curve mean=median

Reasons for variance

- At times our measures are not normally distribute
- In this case the median might be a better measure of central tendency

Correlation studies

- Change in one variable is associated with the change of another
- Geese and leaves; smoking and cancer; testosterone and violence; heroin and marijuana.
- Correlation a statistical measure of the extent of a relationship between two variables
- Correlation allows predictions for one score through known knowledge of another score

- Vary from -1.0 to +1.0 pos. and neg. correlations
- The larger the correlation the stronger the association (ability to predict)
- No relationship = correlation 0.0
- Correlation does not prove causality; to determine causality experiments must be done to test the hypothesis of the predicted correlation
- Ex: increase smoking=increase risk of lung cancer
- Manipulation of one variable causes change to another variable (p8)

Sources of variance

- Explained variance:
- Unexplained variance: not all men are equally violent, why not?

Causality and logical positivism (p5-6)

- Every scientific theory must be potentially falsifiable
- We cannot prove something does not exist
- We can prove something exists
- Ex: first assume testosterone doesn't cause aggression then collect data to prove that it does
- According to many philosophers of the science, we assume all theories are false until proven otherwise
- Experimental manipulation. The experimenter manipulates the independent variable
- This might cause dependent variable to vary
- Ex: violent video game use is linked to an increase in aggressive, but does not cause it

Controversy between theories:

- Does watching violence cause aggression?
- The social modelling theory: we are reinforced by mimicking our peers (model what is considered popular)
- Freudian catharsis theory: exposure to a drive (or repressed urge) will decrease the drive
- Hypothesis: if children watch violence mass media, the aggression will be released
- Hence they will be less aggressive

Design study to test both theories:

- A control group of 10 children cannot watch violence media. They can only watch one nonviolent cartoon per day for an entire month; why is it called a control group
- An experimental group can watch 1 violent cartoon per day for entire month
- Make predictions based on expected results from both theories

Ethics of Research:

- Informed consent
- Can children volunteer to participate?
- Subjects are anonymous

- Results are confidential
- Risks/harms must be explained
- Can we allow children to be very violent in a school setting?

Animals in research:

- Morality of animal research
- Are animals equal to humans?
- Are animals a human resource?
- Acceptable to use animals but there must be some benefit to the world as a whole
- Pain and distress should be minimized
- Phylogenetic scale. Use lowest animals

Normal curve: who created it?

Correlation: helmet use and accidents

- Positive correlation. Why?
- Where is bicycle use highest

How to measure aggression?

- How often do children get into arguments I the school yards?
- Then count how many are usedin argument
- The dependent measure is that which we are measuring

Variables

- Independent variable you manipulate
- Dependent is what we measure (words in an argument)
- Do know why individuals varied in each group (unexplained variance)
- If the independent variable causes the dependent variable to change we will know why (explained variance)

Statistical significance

- Statistical significance: divided explained variance by unexplained variance
- Researcher must indicate what the probability of finding a difference this large by chance alone.
- Ex: level of significance is set at 0.05
- How do we set this level?
-
- Type 1: you claim it is the level
- As a statistician might claim that difference this could only occur by chance 5%

- If we select a control group 100 times we could find difference (between means) this large by chance only 5 times out of 100.

Interpret:

- Null hypothesis: violent video will have no effect on child aggression; null hyp is false
- Psychoanalytical/Freud hyp: violent media will cause decrease; false
- Social modelling hyp: violent media will cause an increase in child aggression; there is enough support to prove this

A difference is statistically significant?

- F= explained var/unexplained var
- Ensure explained var is large
- The size of experimental effect
- Ensure unexplained var is small (ex: by only selecting one gender, same age group, same class...)
- The size of individual differences
- If all individuals have exactly the same score… it is significant
- Shining a light in subject's eyes

Research designs: case studies

- One exceptional individual (or a few people) is/are studied in detail
- Ex: in medicine we study patients in particular ones with rare unknown diseases or disorders; patient HM, who had extreme epilepsy. Regular treatment didn't work. A new treatment was used however as a result he couldn't learn anything new

Problem

- Generalization
- Exceptions to the rule
- Sample size. Often small. generalization
- But power of replication; other researchers also repeat the same study to gather a larger data base
- Repeating your own study would need new samples
- Experiment must be often carried out in a controlled setting (often in a lab)
- Can we apply results gathered in a lab environment in the real world

Group studies- sampling

- Sample a small number of individuals from a population
- Selection is random
- Sample must be representative of the population
- It's better to have a small representative sample than one unrepresentative large one

Quasi- experiments

- Often the experimenter compares one group to another (e.g., males vs. females; young vs. old; patient vs. non-patient)
- Are men more aggressive than women? Would have to manipulate subject's sex
- Do we lose memory as we age? Is it age dependent?
- Testing whether a surgery
- Experimental manipulation NOT carried out
- Assume that difference are caused by independent variable

Experimental designs

- Problem with then use of control- experimental groups
- Soln: us e same group twice or more in repeated conditions (not the same exact test)
- EX: Pre and post experiments
- Problem: carry over effect
- Placebo: a special design is used to examine effects of treatment
- A treatment is given to the patient. Patient improves over times; is improvement due to treatment or would it have occurred over time even without treatment
- The PLACEBO effect
- Experimental group of patients is given treatment
- Other half us given what they think is valid treatment
- This control condition is called the placebo condition

Placebo

- Double blind design
- Effects can be extremely powerful
- No medical treatment that is approved by ministry of health can used with the general public before a placebo effect is carried out
- A placebo is a mock of the real treatment to test effects of the real treatment vs. placebo
- Often doctors will provide placebos instead of painkillers
- Evidence based treatment. Is treatment better then placebo
- Null hypothesis: assume treatment isn't approved
- Alternative medicine: rarely tested against placebo
- Fake acupuncture relieved more pain than pain killer
- True acupuncture did not relieve pain more than fake acupuncture

Surveys

One is asked to report their behaviour attitudes or beliefs typically using a survey

A major problem with surveys is determining of the sample is truly representative of the population

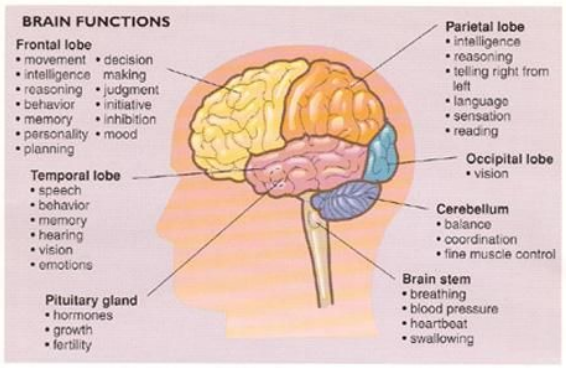
Are those volunteer participants truly representative

Wordings: phrasing can be critical; a certain number of marijuana users will eventually also use drugs such as drugs or cocaine

Scientists have shown that a smoking cig is much more addictive than smoking marijuana

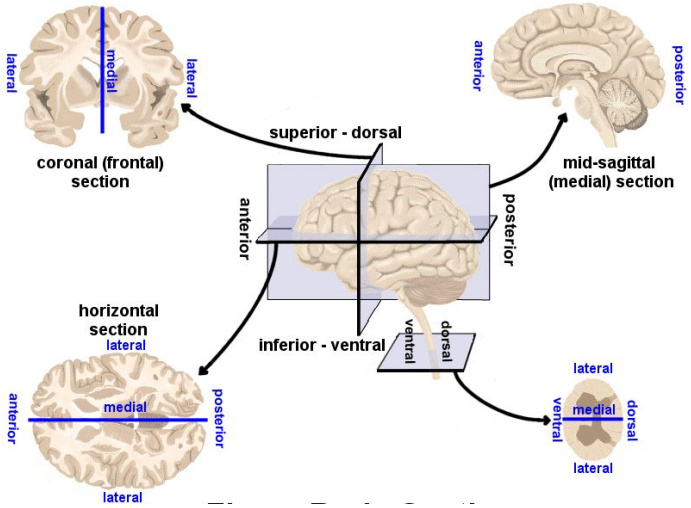
NEUROSCIENCE

SLICES



TERMS:

- DORSAL: DOWN
- POSTERIOR: BACK
- ANTERIOR: FRONT
- SUPERIOR:
- CORNOCAL SLICE VERTICALLY:
- SAGITAL SLICE ATERIOR POSTERIOR
- HORIZONTAL SLICE VETRICAL SLICE



ORIENTATION

- MEDIAL (towards middle) LATERAL (towards outside)
- VENTRAL DORSAL (BELLY BACK) NOT PRIMATES
- ANTERIOR POSTERIRIOR ASPECTS BRAIN (FRONT BACK)
- SUPERIOR- INFERIOR ASPECTS (UP AND DOWN)

Imaging techniques

-Anatomical techniques:

- -Slicing the human brain
- -Viewing macrostructure with the human eye or microstructure with a microscope
- -Appropriate for cadavers
- MRI(mantic resonance imaging
- Advantage: provides high resolution images of the human brain
- Problem:
- Static. Provides an images of the structures but does not indicate their functions
- Resolution is limiting (cannot see single cells)
- Units: tesla
- Very expensive
- Provides only a static view of brain
- Very expensive
- Does not provide image of active brain

Functional techniques

What areas of brain are responsible for certain actions?

In the clinical setting: observe functions which ones are lost what parts of the brain are damaged

Problem: human brain injuries are often widespread and not highly specific

The Brain and Nervous System

- White matter: connection pathways for different functions
- In the experiment setting: lesion a specific part of the animal's brain to determine its function
- Stimulate
- Ontogenetic: origination and development of an organism throughout its life. Not phylogeny
- Difficult to know what an animal really experiences
- Higher mental states differ throughout species

Human stimulation techniques

- (TMS) trans-magnetic stimulation
- Deep brain stimulation (DBS); typically used for epileptic patients

Positron Emission Tomography (PET)

- Deoxyglucose injected into the blood; area of brain most active receives it
- Indicates which areas are active (and require glucose) for a task to be completed
- Alzheimer's disease: loss of neurons mostly near the…
- Disadvantages:
- Invasive. Requires Deoxyglucose to injected into blood radioactive agent
- Very slow. Blood circulates slowly. The PET provides an image of all the brain areas that were active within the last 12 minutes
- The brain makes rapid decisions.
- Expensive

Functional MRI (fMRI)

- Uses MRI scan
- Indicates which areas are active and require oxygen for a task to be completed.
- High resolution image of brain structures

Visual processing

- Recalling information once received activates much more of the brain than receiving information

Disadvantages

- Slow. It can be as fast 200-500 ms to obtain image, but the brain makes decision much more rapidly than this.
- Poor spatial
- Fvfhvfv something else

EEG/Evoked potentials

- Electrode attached to the scalp
- Provides an indication of the electrical activity of the brain
- When a stimulus is presented the changes in the electrical activity evoked potentials can be measured
- Provides rapid info. Processing in the brain can determined every 1 ms
- Very inexpensive

Diffusion spectrum imaging

- Can be used to observe brain connection pathways and what areas of the brain are connected together.
- Studying the developing nervous system

Neuronal and synaptic transmission (Madeline Lancaster)

- Can change the charge to transfer info from one neuron to another

Neuron: define parts and their functions/correlations (axon, soma, cell membrane, myelin sheath)

- Soma (cell body)
- Dendrites
- Nucleus
- Axon: grey and white matter (length of axon)
- Long: have myelin sheath. Short; do not
- Myelin sheath
- Lipid material
- Protects the axon
- Insulating material
- Speeds up transmission

Terminal ending

- Learn Diagram

! The Nobel Prize given to C. Golgi and S. Ramon y Cajal!

- Had contradicting theories
- Did not agree with each other or work together
- Audio cortex
- Visual cortex
- Cerebellum
- Primary motor cortex
- Dentate gyrus
  3 categories of neurons
- Sensory neurons: transmit impulses received by the sensory receptors to CNS. Afferents
- Nerve is 1000s of axons not a single
- Afferents: message or stimulation coming from the CNS
- Efferent: E for exiting
- Motors neurons carry outgoing signals from CNS to muscles and glands; Efferent
- Interneurons. E.g.: ganglion
- Interneuron communication
- Often far removed from either sensory or motor neurons
- Excitatory or inhibitory
- Allows flexibility of behaviour
- Some evidence that neurons In the CNS might regenerate; 99% proof points towards the fact that they don't. However, we don't know why they don't.

OCT 4TH, 2016:

ENDORPHINS (neurotransmitter):

- Called natural opiates of the brain- natural pain killers
- Because chemical structure is similar to opiates (heroin, morphine)
- Inhibit sensation of pain
- Increase mood and pleasure

ANATOMY AND FUNCTION OF NERVOUS SYSTEM

- NS diagram:

Peripheral NS: diagram

- Sensory receptors- in the body and also specialized receptors in the head (each organism has diff receptors
- Sensory nerves- afferent input to C.N.S in the body soma in the head specialized senses
- Motor nerves- efferent output from the C.N.S to the muscles; motor action
- Muscles:
- In the body and head) movement of head face eyes ears etc.)
- Heart, lungs, etc.
- Autonomic system
- sympathetic (need for energy or action)
- Parasympathetic (calming; return to normal functioning)
- Parasympathetic rebound- paradoxical event

Central Nervous system:

- Lower rate of regeneration once damaged
- Therefore heavier protection is needed
- Spinal cord diagram

GANGLIA:

- *Cranial Nerve X*
- Each controls something different
- Very important

Monosynaptic reflex:

- unlearned Rapid action

Evolution of the Brain:

- diagram

DIVISIONS OF BRAIN: *hind brain and mid brain together make up the brain stem*

Hind brain:

- medulla; pons

Midbrain (largely in fish)

Forebrain

- diencephalon; cerebrum (largely seen in reptiles and bird)

THE BRAINSTEM

- Permanent damage to the brain stem will result in immediate death or coma
- Medulla, pons, midbrain
- 12 cranial; sensory and motor nerves
- Cranial nerve 10 (vagus nerve): controls internal organs
- Specialized senses of the head
- Head muscles
- Life support systems- temp; heart, respiration. Vagus nerve
- Sleep- walk cycle
- Reticular (network) activating system; activating one part activates several other parts as well (general arousal).
- The animal mind capacity

The Cerebellum

- Co-ordinates, movements that are learned
- Nonverbal learning

The diencephalon

- Inferior to thalamus is hypothalamus
- Hypothalamus monitors blood supply: levels of nturients, water, oxygen, temp, hormones

The thalamus

- Receives input from all sensory systems (exception olfaction)
- Massive grey area (neurons are very small)
- Has specific sensory nuclei
- Several association areas- no direct sensory or motor connections to the outside area (where memories reside)
- Frontal lobe (central executive) decides what incoming info is relevant or irrelevant
- Acts as receptionist/ filter for the neocortex

Thalamic-cortical connections

The hypothalamus:

- Monitors basic drives: hunger, blood supply.
- !results of stimulating different areas!
- Autonomic NS- basic needs
- Control of the endocrine system via the pituitary gland
- Decides whether to increase or decrease a hormone. Then sends a signal to the PG, which then releases the particular amt. of that hormone.

Endocrine system

- Control of the endocrine glands via pituitary gland
- The pituitary controlled by the brain
- Tier action is slow an long lasting
- Neuron: direct in contact with target communications via neurotransmitters
- The action of a neuron is rapid and can be specific or nonspecific

Basil Ganglia

- Receives input from motor cortex
- Control of movement and posture
- Direct intentional movement
-

Human Stimulation Techniques

- Trans Magnetic Stimulation (TMS)
- Deep Brain stimulation (DBS)

Dopamine

- Predominantly inhibitory
- implicated in movement attention and learning
- Insufficient amounts of DA: Parkinson's Disease
- Tremors and paralysis
- Too much DA: psychosis

The Cerebrum (Neocortex)

- Architecture (6 layer)
- Complex interconnections
- Sulci and gyri
- Longitudinal, central, lateral fissures
- Frontal, parietal, temporal, occipital bones

- Pre central, post central gyrus
- Corpus Callosum
- Neocortex- 6 layered grey matter

Subdivisions of Neocortex

*pic

Functional Neuroanatomy

- Phrenology(F.Gall)- Found bumps on the head(over developed)
- Giving functions to the different structures of the cortex (Reductionism)
- Brodmann's Areas- Looked at different structures of cortex(numbered the different areas), noted how structures were different from other ones

    ex) auditory meatus is numbered 41

- MRI and fMRI
- UK normative study (Scanning n= 100000 brains)

Nature Video

- Looking at 10 individuals
- Ultimate brain

Sensory/ Motor Cortices

- Vision (occipital lobe)- if damage occurs ur cortically blind (can see but not confident)
- Audition (gyrus of Heschl - temporal lobe
- Somatosensory (postcentral gyrus- parietal lobe)
- Motor (precentral gyrus- frontal lobe)
- Cerebellum

Homunculus

Primary Sensory cortices

- Detect basic features of stimulus (where is the stimulus located)
- Location
- Duration
- Intensity
- Pitch, colour
- Touch, temperature
- Compare these features

Speech Areas

- Controversy
- Motor(communicate) aspects: Broca's Area
- ex) Left handed, right hemisphere
- Sensory (receptive) aspects: Wernicke's Area
- Non dominant hemisphere: "tonality", emotional expression
    - understand words but no emotionality in speech

*Association Areas

- Looks at basic areas and functions
- Don't know that much about frontal lobe
- Massive areas of frontal, parietal,

Evolution of the Brain

Frontal Lobe

- Motor aspects
- Selective attention, concentration, "will", initiative of action
- ex) Will I come to class today
- What will I attend to? "executive" control
- Inhibitor of inappropriate action; social norms
- Control of emotions
- insight, logic, feedback (correction of errors)
- Consciousness, self consciousness, personality

Lack of initiative; word fluency

Correction of Behaviour

- Correct error
- Flexibility of concept (colour, shape, or number)
- Sorting into different categories

Evolution of frontal lobe

- 18 years

Consciousness, Self Consciousness

- Attention and consciousness
- Knowing Consequences
- Sequencing, planning
- Prediction of future

- Theory of Mind: understand and identify the thoughts, feelings and intentions of others

Parietal Lobe

- Postcentral Gyrus
- Wernicke's Area
- Brain surgery: don't want to remove areas of speech
- Permanent memory systems?
- Naming objects?

Naming Objects

- Naming can be more specific
- Can name but can't name some

**Hemi-Attention

Temporal Lobe

- Auditory cortex
- Wernicke's Area
- Archicortex (3 Layer): Hippocampus, amygdala
- Short term memory systems
- Removing temporal lobe: Short term memory loss

Hemisphere Differences

- Dominant hemisphere (left handed, right hemisphere(dominant))
- language
- mathematical operations
- logic
- Non dominant hemisphere
- Spatial construction/ block design
- Face recognition
- Tonality, emotionality expression/ music
- Corpus Callosum

Limbic System

- Emotional system of brain
- frontal lobe that will inhibit the emotional side
- Olfactory nerve, Amygdala, hippocampus, septum, hypothalamus
- Frontal lobe

Survival of individual and species (4F's)

- Feeding

- Fighting
- Feeling
- Undertaking mating behaviour

Sensation and Perception

Audition

- Physics and acoustic energy (sound)
- The ear
- Frequency coding
- frequency theory
- place theory

Physics of Sound

- Frequency (Hz)
- Intensity (dB)
- Location
- Duration

Intensity Scale

- decibel(dB)
- measure of sound pressure level
- log scale
- increase in intensity, increase in pressure (increase in 10 decimals)

Risks to Hearing

The Ear

- Outer ear
- Pinnae
- Auditory canal
- Middle ear
- ear drum
- Hammer, anvil, stirrup
- Inner ear
- cochlea
- Auditory nerve

Movement of fluid

- waves like the ocean

The ear

- hair cells on basal layer
- pulling on hair causes action potential and sends synapse

Frequency (temporal) theory

- Frequency (number) of times auditory nerve fires code frequency
- Intensity coded by the number of auditory nerve neurons that carry signal
- more fibers, louder the sound

<u>Problems</u>

- Limit to the frequency at which a neuron can fire(upper limit is 1000 Hz)
- However we hear frequencies up to 20,000Hz

Place Theory

- Frequency coded by place stimulated on tympanic membrane
- Intensity coded by the frequency of firing
- Higher frequency, more action potentials
- Neuronal populations throughout the auditory relay system (brainstem, thalamus, auditory cortex) to respond to very specific frequencies
- Damage to basilar membrane will result in hearing loss to predictable frequencies

<u>Problems</u>

- Low frequencies generate a general movement of the basilar membrane. We should therefore hear mixed frequencies

Location of sound

Localization of sound

- Time difference between arrival of the sound
- Intensity difference between the ears

Cochlear implants (bionic ear)

- Cochlea destroyed, hearing not possible
- A microphone, a processor, a transmitter and receiver/stimulator
- An electrode array (perhaps 20-50) implanted in different regions of the auditory nerve
- The sound the listener hears is not completely natural

- Small number of electrodes not thousands

Newer Method

- stimulate single nerve fibre

Auditory Pathway to cortex

- 1. medulla, 2.midbrain, 3. thalamus, 4. auditory cortex

Identifying sound and sound location

- Thalamus> primary auditory cortex
- What? structures anterior to primary auditory cortex and anterior frontal lobe
- Where? Posterior to primary auditory cortex, parietal lobe, and frontal lobe

Nobel Prize

- 2013: James E.rothman, Randy W. Schekman and Thomas C.Sudhof
- 2014: John O'Keefe, May- Britt Moser and edvard I moser

Nobel Prize (literature)

- 2013: Alice Munro(Canada)
- 2014: Patrick Modiano(france)
- 2015: Svetlana Alexievich(ukraine)
- 2016: Bob Dylan(usa)

Vision

Adaption

- If a stimulus intensity remains constant, our sensory receptors adapt to it
- We therefore no longer “experience” the sensation

Physics of light

- electromagnetic signal whose wavelength varies from 400-700 nanometers (this is called light)

Parts of eye

- Cornea
- Lens
- Iris/Pupil
- Retina

- Cones and rods(vision in bright light-cones)(vision in dull light-rods)(back of retina)(up growth of brain)
- Fovea (front of retina, light has to penetrate through the layers)
- Blind spot

The Retina

- The rods and cone share a chemical rxn to light
- If the reaction is strong enough, the bipolar cells will be activated
- Bipolar cells activate ganglion cells
- The axons of the ganglion cells converge at the “blind spot”

Blindspot

Cones

- packed in the centre of the retina, near the front of the eye (where vision is most acute-acuity)
- Colour vision: three types of cones
- red, green, blue(psychological)
- A single cone may project to a single bipolar cell
- Output of the cone will have to be very high to activate the bipolar cell
- The output is dependent on the intensity of the light
- Need a great deal of light to see in colour

Rods

- In the periphery
- more rods than cones
- spaced relatively far apart
- Excellent for determining movement
- Not sensitive to colour
- Several rods project to a single bipolar cell
- Thus, sensitive to very low levels of light
- might be able to detect some colour (ambulance)

Colour Theory

- Two theories to explain how we see colour

Young-Helmholtz Theory (support)(3 colour theory)

- 3 types of cones
- All colours are made by mixing these three colours

Young Helmholtz (Against)

- Never see a reddish- green nor blue-yellowish
- We see yellow and white
- Colour blindness: Always red-green or blue-yellow colour blind. If we damage the red cones, would we not bus be red colour blind?
- Colour adaptation: Studies in which subject looks at colour and then looks at a neutral surface (negative after image)

Hering 2 colour theory

- Opponent colour theory
- Red and green cones project to a common bipolar cell
- Red- green bipolar cell increases firing when red is presented but decreases firing when green is presented
- Blue and yellow

Evidence for 2 colour theory

- Colour blindness: how is this explained?
- Colour after images. How are these explained?
- Evidence against: we do have 3 cones

Perpetual Context

- Context can influence how we perceive
- Identical colours will not appear to be identical if presented in different background colours
- Grey will appear darker if presented against a white background than a black background
- ex) Physically identical but context is different, dogs perceived to be same(physically) but different colours

Learning to Perceive

- To what extent is perception inherited (ex) unlearned)) and to what extent is it learned?
- Test those who although blind from birth have recovered their vision
- Patients could distinguish figure from ground
- Patients could detect colour
- could recognize objects
- Inability to recognize faces as a whole but could recognize parts
- Lack of perceptual constancy

Perceptual Adaptation

- If your visual world were suddenly changed.. could u adapt?
- Could u re learn?
- Non mammals cannot adapt (re learn) if the retina is located

- Kittens, monkeys, and humans can relearn(adapt) to the visual reversal
- But dependent on CRITICAL period
- Critical period: small period of learning phase

Experimental Studies

- Kittens raised in environment consisting only of vertical or only horizontal lines (blakemore and Cooper studies)
- Kitten raised in one environment could not perceive the other environment
-

Consciousness

- Breakthrough Prize: Mark, sergey, Jack ma

Life Sciences

- Karl Deisseroth

Consciousness

- can be studied as a process or as a state (awake/sleep)
- Sensory receptors bombarded with input
- Sensation: automatic, effortless feature extraction
- Assumed to occur prior to consciousness(awareness)
- Only conscious of only a small portion of this input
- Why aren't we conscious everything? Limited capacity system

The process of becoming conscious

- We became conscious of that which is.. Relevant (all other messages get filtered out)
- Cortex will filter out the information we don't need
- How do we determine what is relevant?
- Psychological (personal) relevance
- Biological relevance

Active and Passive Attention

- To become conscious requires additional processing: attentional(active) processing: What u do, participate, requires effort
- Psychological relevance= active attention
- Top down processing
- Biological relevance= passive attention- Bottom Up processing :alarm

Selective (active) attention

- Process by which we become conscious of stimulus
- Top down
- Observer must choose to become aware of that which is relevant
- Failure to choose results in
- Information overload
- The central executive(frontal lobe) determines features of what is relevant, stores thesein working memory (top down processing)
- The features of all incoming stimuli (ie whether attended or ignored) are automatically extracted and...
- Compared to those exist in working memory

Working memory and cortical effort

- Features match: further processing is warranted (consciousness)
- Features do NOT match, further processing should cease
- Processing of that which is irrelevant is inhibited
- The input can thus be ignored
- Holding info in working memory requires effort!
- “Active” attention

Passive Attention :Becoming conscious of the unattended

- Fate of a highly relevant biological stimulus input
- that occurs when the observer is not attending?

Passive Attention

- no effort required
- Bottom up processing
- While engaged (or attending to) another task
- A highly novel (intense) privileged stimulus input will force the observer to..
- Switch attention away from whatever they were doing
- and now attend to the processing of something that is potentially much more relevant
- Intrusion into consciousness
- Distraction
- Car advert

Capacity theory

- Daniel Kahneman (Nobel Prize 2003)
- Some tasks require a great deal of cortical effort while others require little

- The central executive determines how resources will be divided based on the demands of the various tasks

Controlled and automatic Processing

- Tasks that make larger demands on the central resources will require cortical effort and controlled processing
- Tasks that make minimal demands can be carried out effortlessly using automatic processing (riding a bike like listening to music, riding a bike is automatic now)

Controlled Processing

- Requires effort, uses processing resources
- Serial Processing. Processing of a secondary task until the processing of the first task has been completed
- Multitasking: serial processing
- ex) finding T out of alot of letters

Automatic Processing

- no effort required
- can become automatic with practice
- Several tasks carried out simultaneously
- Parallel processing. Multitasking
- Myers- dual processing
- ex) T is in red so easy to find

REM Sleep

- Muscle inhibition
- Rapid eye movement
- Dreaming
- Absence of frontal lobe functions ex) without frontal lobe story won't make sense and wouldn't be logical.
- Period of profound unconsciousness?
- However, lucid dreamers can signal they are dreaming. Moreover an experiment can influence the content of their dreams.
- Inhibition of autonomic nervous system
- Tim Biskup painting " golden plague"

Why do we dream?

- Release of repressed desires/ drives from the unconscious (Freud)
- The actual content of the dream (its "manifest" content) is symbolic of our true (but repressed) desires (the "latent" content)
- Inhibition of frontal lobes during sleep(dreams not going to be logical)

- Recall function of frontal lobes: logical thinking
- Does this explain bizarreness of dreams?

Dreams and Nightmares

- Strong emotional REM dream (fear, but also sadness, despair)
- Occur most often in teens (40-50 %) and about ⅔ of adults
- May reduce emotional anxiety, trauma

REM Sleep- “Paradoxical” Sleep

- What is the “paradox”?
- According to Myers the cortex is very active and wake like but the muscles are inactive
- Other researchers: The cortex seems to be consciousness

The purpose of NREM/REM Sleep

- When does NREM and REM occur during the night?
- Changes within the human species
- Changes across species
- Sleep deprivation
- Learning/ memory during sleep

Onto and phylogenetic changes

- Does NREM and REM development first in humans? why?
- Which therefore is oldest? Which is oldest? Why?

Changes over Life Span

- In young adult, 50 % of sleep is spent in stage N2; 25% in stage N3; 25% in REM
- REM accounts for 50% newborns sleep;even more in premature infant
- REM rapidly declines in % after birth. Recheas adult levels at 8-10 years of age
- Stage N3 (“Delta”) declines in elderly

Recapitulation Theory

- Also called biogenic law
- Ontogeny recapitulates phylogeny
- How is sleep defined? not conscious during sleep
- Problem: Both REM and NREM are multifaceted
- Changes in motor activity, cortical arousal, eye movements, muscle atonia, changes in autonomic systems, temperature changes
- Temperature/autonomic changes not incidental warm/ cold blooded division)
- Difficult to reply on data across species

Purpose of NREM/ REM sleep

- Changes within human species
- Changes across species

Sleep for energy conservation?

- Smallest animals have the highest metabolic rate (ie. energy consuption per kg body weight)
- Animals with high metabolism have longest total sleep time (TST)
- Recovery from days
- Sleep conserves energy
- The ground squirreel and little brown bat sleep 16.6 and 19.9 hrs while large animals might sleep less

Predators/Preys

- Arousal to awaken thresholds are high during REM
- Predators have the luxury of being able to enjoy long hours of sleep, especially REM sleep
- PReys enjoy less REM sleep
- Large animals (slow metabolic rate) so less sleep

Mammals

- Need to maintain near constant temperature
- Need to breathe
- Muscle atonia during REM

Sea mammals

- Muscle anotina during REM
- Sea animals must constantly be in motion
- The sea animal may sink (breathing? temp regulation?)
- Some come to land to sleep and others SWS:one hemisphere awake, other hemisphere SWS
- Muscle atoni other half. One hemisphere is sleeping and other is awake

Deprive animal of sleep and observe effect

Total Sleep Deprivation

- Humans can tolerate days without sleep
- Major effect: sleepiness, irritability (loss of emotional control)
- But fatigue is not uniform throughout the day
- Problem: Both NREM and REM

Total Sleep deprivation

- The first area that falls asleep is the frontal lobes
- Frontal lobe processing. Cognitive tasks that are modulated by the frontal lobes are especially affected by sleep deprivation
- Animals kept awake will develop sores on their body and matting of fur
- After a few weeks they will die
- Role of the immune system. It appears that the immune system is active in NREM sleep
- When permitted to sleep, how much does the sleep deprived subject actually sleep?
- Rebond: when permitted to sleep
- to measures: Rapid onset of sleep (NREM), More stages N3 than normal

Theories of NREM sleep

- First half of the night's sleep is spent in NREM sleep
- NREM sleep deprivation...animals become very sick and eventually die
- Immune system is especially functioning during NREM
- Growth hormone released during NREM

Theories of NREM sleep

- Brain cells in the mouse sink **
- Release of growth hormone during NREM for growth but also for cell repair
- Regeneration and repair of cells
- The elderly who are less active than the younger adult have less stage 3+4
- Restoration function

Memory/Learning and sleep

- Rash B and Born J and about sleep's role in memory
- A task is learned during the day and then performance measured just before sleep
- A task is learned prior to sleep and then performance is measured after sleep
- Performance is better after sleep
- Bur certain tasks depend on NREM, others on REM sleep

Learning and NREM

- Learning of many novel tasks, storage during NREM
- Brain areas that were active during the initial learning are reactivated during NREM

Theories of REM sleep

- Infants and young children have more REM than adults
- Occurs mostly in 2nd half of the night (not biological necessity)

Learning REM vs NREM sleep

- Cleanup of irrelevant material (Crick and Mitchison)

REM deprivation

- REM bound
- - More REM earlier entry into REM at the beginning of the night
- - Many CNS depressants will cause moderate to severe loss of REM. Upon withdrawal of medication, REM rebound often with nightmares
- Deterioration of performance on tasks learned the previous day

Sleep Disorders

- Insomnia
- Narcolepsy
- - NREM/REM
- Cataplexy
- Hypothalamus and decrease in orexin in brain
- Orexin: role in arousal, locomotion, expenditure of energy and craving in food so you're more active. Treatments: gives stimulus
- fMRI in narcoleptics

Sleep disorders

- Apnoe (mainly in older, obese adults sleeping in prone position)
- Perhaps sudden infant death (SID) syndrome

Altered States of Consciousness: The effects of psychoactive drugs

Psychoactive drugs

- perhaps changes mood
- change perception of external and internal environment
- “The doors of perception”

Types of Psychoactive drugs

- Depressants (“downers”. Inhibit neural function
- Stimulants “uppers excite neural functions. increase cortical arousal
- Hallucinogens . distort perception

Tolerance (Neuroadaptation)

- With repeated use, tolerance develops
- Al larger dose is required to produce the same initial effect
- Physical dependence (physical addiction). How is this defined?
- Tolerance is not experienced equally at all parts of the body
- For some drugs (particulary the hallucinogens) there may be negative tolerance

- Drugs might linger in the body for a *

False claims

- lead to addiction
- some or little physical addiction
- Highly addictive drugs show addiction

Depressants- Alcohol

- Most commonly used drug
- Always depresses neural activity regardless of dosage
- depresses frontal lobe control (over limbic system)
- Impaired judgement, self monitoring, and inhibition.Inability to inhibit inappropriate behavior
- Effect on transfer of short term on permanent memory

Opiates

- highly addictive
- Small amount of population use this
- Chemicals such as morphine and heroin that are made from the opium poppy
- Depress nervous system activity, this reduces anxiety and especially reduces pain
- High doses of opiates produce euphoria
- Imitate the natural neurotransmitters
- Opiate use increasing dramatically
- Opiate based painkillers

Stimulants: Nicotine, caffeine

- Stimulate sympathetic: cortical arousal
- Stay awake, lose weight, boost mood, athletic performance
- Physical or psychological addiction?Monkeys will press level at high rates (10-15000 times) to obtain cocaine. Give animal a choice

Hallucinogens

- Cannabis (marijuana, hash)
- Psilocin (magic mushrooms), peyote (mescaline), LSD

Marijuana

- Most illegal drug, involves marijuana/ hash
- Active ingredients
- Amount of THC has increased sharply in “street” marijuana over the last 10-15 years
- Recent (2000+) research suggests that there are THC receptors (cannabinoid receptors) in the brain (especially frontal lobes, limbic system)

- Lingers in brain for long periods because we don't have the natural enzymes to break it down (negative tolerance)
- No evidence to prove its physically addictive but is psychologically active
- May be an effective pain killer:
- Effect on performance
- Large increase in marijuana use in 1990, usage is level off recently
- USage may be negatively correlated to legality (ex. NL. Portugal) but there are exceptions (Canada)

Hallucinogens

- Lysergic Acid Diethylamine
- Many of these are similar in chemical structure in serotonin (5-HT)
- Little evidence of addiction
- Psychological experience varies widely among individuals
- Hallucinations (can be large) perhaps synaesthesia

Drug Usage

- Usage for various drugs rises and declines for a number of reasons
- “fashion”, social pressure
- Many cultural, ethnic, religious, and racial differences
- ex) alcohol

Drugs and Crime

- Many cultural, ethnic, religious, and racial differences
- A crime (in most of) US. why?
- Logic:Punish severely= lower usage
- Netherlands and Spain, possession of small quantities
- Cannabis usage is much lower in the netherlands and in the US
- But usage is higher in canada than US and in canada there are certain provinces that are more tolerance and have a higher usage :Quebec
- Portugal decriminalized usage of all drugs in 2001
- Sharp drop in usage of heroin and marijuana; deaths from heroin have halved’ crime rates much lower
- Colorado, and washington states legalized of marijuana
- Usage among teens has dropped or slightly decreased
- Crime rates have also dropped
- Increasing liberal views to drug use

Drug Policy and Harm

- Many countries” recreational drug use is detrimental
- “Wars on drugs” generally accepted that is is ineffective

- Public confused about the risks involved with drug taking
- Government warnings often do not agree with what the scientists claim are the effects of drug

Ratings of drug harm

- Most governments and the WHO
- Nutt er all David nutt: pharmacological scientist

Learning and Conditioning

Habituation

- The response to a repeated, constant stimulus becomes smaller and eventually ceases(stops)
- Similar to adaptation
- Habitation involves the formation of a memory of the features of the stimulus
- Features of incoming stimulus compared to what exists in memory
- If they match, response will be smaller, don't wanna bother the cortex
- Habituation involves the formation of new memories and learning. we are not conscious of this and we learn not to respond

Implication

- Habituation Occurs in simple nervous system
- formation of memories in these simple nervous system is assumed to be the same as in more complex nervous system

Classical conditioning

- Principles first discovered by I.Pavlov in Leningrad in the early 1920's
- Unconditioned, conditioned stimulus
- Note" myer calls UCS,

Classical conditioning- Acquisition

- Association is formed between two previously unrelated Stimuli (UCS+CS)
- Observer learns that one stimulus
- LEarning takes time
- CR only occurs after a number of repetitions of UCS

Generalization

- Following conditioning, other stimuli similar to the CS will also elicit CR
- Closer the CS: larger stimulus response

- can explain many human fears and phobia

Extinction

- Remove UCS
- Results: CR will gradually diminish. This process is called extinction

Spontaneous Recovery

- After extinction and some delay, CS alone UCS) will elicit CR

Operant conditioning

- Thorndike's: law of effect
- Skinner: Reinforcement, punishment

Thorndikes law of effect

- Respone that produce stimulus

J.watson and BF skinner

- Watson: laid out the basic tenets os the science of behaviour
- Psychology should study that which is overtly observable behaviour
- The study of that which is not observable: soul, mind, conscious repressed will be banned

Motivation

Social biology and ethology

- human behaviour has evolved from animals
- Many animal and human behaviours are inherited
- In the past these were called instincts
- An instinct should be common to all members of the species
- Many instincts were identified

Value of actions

- Pleasure a basic physiological motivator
- Pleasure is associated with stimuli that enhance biological well being
- Pain us associated with events that threaten our survival
- Reinforcing consequences of an action determine if it is worth repeating

Brain centres of “pleasure”

- Metabolic dopamine system

- many different stimuli will activate this system
- Perhaps common to all pleasure (food, drink,sex, etc)
- Drugs also activate the system

Hunger

- Mechanisms underlying “feeling” of hunger : Central and Peripheral
- Hunger disorders?
- Physiological drives
- Social “modelling”
- Basic biological need to seek calories (sweet food) and to avoid toxic agents (bitter food)
- Role of learning and conditioning
- Ex) preference for sweet taste is universal (thus a need), preference for every salty and sour is not (thus learned)
- Hemostatic motive, need to keep a sufficient supply of energy (especially glucose) available.
- Food is pleasant for reinforcer. Artificial sweeteners (provide sweetness but calories)

peripheral studies

- Cannon’s studies
- If the stomach is filled with a pumped up balloon, we still experience hunger
- Stomach and intestines(hormone: CCK) do sigal food intake
- Also the feeling of hunger will decrease dependent on extent
- Central signals: Lateral and Ventromedial in hypothalamus

Lateral hypothalamic

- Food deprived, releases orexin
- Stimulation results in massive overeating
- lesions result in an animal refusing to eat
- Problem: peripheral and signals in the stomach (ghrelin) and intestines can also trigger hunger

Ventromedial Hypothalamus

- Stimulation results in starvation
- Lesions cause animals to eat huge quantities
- Problem: several hormones may be released by the stomach and intestines (Especially pectin YY) signalling “fullness”

problems-central signal

- Other sites (stomach and intestines)
- “set point” in lateral hypothalamic animals in force fed
- “set point” in ventromedial animals
- Metabolic rate. animals on semi starvation diet reduces activity to conserve energy

physiological factors

- **Taste preferences:**
- Some preferences are universal and this genetic (sweet)
- Other tastes are conditioned and learned (excessive salty)
- **Ecology of eating:**
- Social factors. We tend to eat more with others (facilitation)
- Unit bias- we'll eat more if presented with large quantity- supersizing

Eating disorders

- Anorexia:
- Definition: weight at least 15% less than normal
- PErhaps 1% adult females
- PRedominantly young (teens- 30 years), white and high socioeconomic status
- Denial that there is a problem, they think their overweight and not under weight
- Biological/genetic. Hypothalamic dysfunction?
- Slight tendency: for identical twins to share the disorder more than fraternal twins
- Causes: family emphasis on achievement, perfectionist standards, low self esteem
- Cultural causes: Social value placed on 'thinness" in west

Cultural norms

Perceived "ideal" body weight

- Female and male students asked to rate different silhouette figures according to:
- how would u perceive themselves, their ideal appearance and, what they think
- Males and females perceive their weights as being about equal
- Male"ideal", what they think females will find as 'attractive' and what females claim to be ideal

Obesity

- a much more serious problem than anorexia
- In the last 40 years, obesity has more than doubled and in adolescents more than quadrupled
- Rates in the west vary from 30%-705
- Genetic factors in weight extremely important
- Identical twins raised together have nearly the same weight
- But they share the same gene pool and same environment
- But, identical twins raised apart also have nearly exactly the same height
- Different unrelated subjects given the same calorie rich food to see their weight
- Number and size of fat cells. Obese have more fat calls and these are larger
- With dieting, the fat cells may shrink, but the numbers does not
- High 'set point"

Social factors

- last 40 years, obesity increased
- We eat more than exercise
- calorie intake has increased
- Cheaper for restaurants to offer all you can eat buffets (super sizing)

Losing weight (dieting)

- might affect appetite directly
- might lower “Set point”
- Effects might be indirect more exercise
- But when dieting ends, one returns to the normal high”set point”
- Dieting rarely works in the long term

Problems:

- Weight loss also includes muscle
- Losing muscle is not a good thing
- eat more under stress
- external cues: the overweight seem to be overly sensitive to the pleasant taste and appearance of food

Sexual motivation

- Human sexual behaviour
- Peggy Kleinplatz
- Elke reissing
- Surveys of sexual behaviour in humans
- These are usually exceedingly difficult to interpret
- Samples are rarely representative of the overall population. It is thus difficult to generalize to the overall population

Can the results of surveys be believed?

- Kinsey's reports (1940-1950s)
- 5000 men and 6000 men sampled
- 50 % men claimed they had experienced extramarital sexual intercourse
- Conservative estimated now claim 60 % females to have

Sex hormones(non primates)

- In non primates, females sexual activity is almost totally dictated by the hormone, estrogen
- The female is receptive (in heat) when the level of estrogen peaks during the ovulation period

- Male hormone (testosterone) levels are more constant. Sexual activity is more constant
- However, castrating males (removal testes) will typically result in loss of interest in sexual activity
-

Sex hormones (primate)

- Hormones play much less of a role in primates particularly so for humans
- A good deal of human sexual behaviour has little to do with reproduction of the species
- Females will engage in sexual behaviour when they cannot possibly become pregnant
- Women are very receptive just prior to and just following menstruation
- Thus, social (not biological) factors play a major role in determining human sexual activity
- But social biologists claim that this will assure survival of the species
- Why? How?
- non primates are driven to sexual activity
- Humans don't know when they're ovulating so role of consciousness, frontal lobes
- Role of reinforces, pleasure
- Role of social interaction, love
- Raising of offspring

Social factors

- But social biologists claim that this will assure survival of the species
- Role of consciousness, frontal lobes
- Role of reinforcers, pleasure
- Role of social interaction; ”love”
- Raising an offspring

Biology of Love

- “stages”: initial attraction, lust
- higher levels of dopamine, serotin, noradrenaline during initial attraction
- Oestrogen, testosterone during lustful stage
- Women are also influeced by testosterone
- “falling in love”
- T levels inrease for females
- Birth of children: decreases for males

Oxytocin

- Released by hypothalamus
- Acts as a neurotransmitter in the brain
- Released during sex, birth, breast feeding
- Very large amounts released
- Associated with pair bonding in monogamous animals. associated with trust

- Used as antidepressant
- Decrease amount of oxytocin in postpartum

Sexual Response Cycle

- Excitement, plateau, orgasm, and refractory periods
- Sexual excitement/arousal: release of dopamine. (associated with pleasure and bonding)
- Oxytocin

Gender and sexuality

- In almost all cultures, men initiate sexual activity more frequently than women
- Men are much interesed in (and accepting of) casual sex
- Men are more interested and women less interested

Age differences between males and females

- Males continue to engage in sexual activity into their 70's
- Females? a marked loss of interest in their 40's, early 50's
- Middle aged men engage in extramarital affairs more often than females
- According to the socio biologists this assures continued reproduction of their genes

Sexual orientation

- All cultures are prodominantly heterosexual
- Homosexuals (gay and lesbians) are always a minority
- Perhaps 3-5% of men are gay. Perhaps 1% of women are lesbians
- Heterosexuals have heterozexual fantasies
- Difficult to change sexual orietation

Physiological causes

- Unusual parental relationships(dominant mother, ineffective weak father)-no
- childhood sexual experiences (abuse by a homosexual)-no
- Dating experiences-no
- Develop sexual relationships with those whor different

Genetic/ biological cause

- Genes- if one of a pair of identical twins is gay, 50% likelihood that other will be gay. Amongst fraternal twins, 20% probability

Womb environment

- Evidence that womb environment may be exposed to androgens which may be lead to male homosexality

Sexual dysfunction

- Men- erectile dysfunction
- Women: low desire or orgasmic disorder about 40%, orgasmic disorder about 25-40%, causes distress about 15%
- teens especially vulnerable (immune system not mature)
- Condoms 80% effective

Teen pregnancy

- Minimal communication about birth control
- Except teens who talk openly with parents
- Involved in exclusive relationship
- Guilt about having sex
- Mass media norms. Communication about birth control and STI rare

The need to belong (socialization)

- Social animals need to belong to a group
- Socialization increases probability of survival
- Children raised in isolation: withdrawn fearful, adults:depressed
- Adults may remain in abusive relationships
- Peer conformity

Social networking

- Computers and smartphones
- teens, young adults
- going online and less time spent with friends
- Addiction and deprivation

Emotions

Problems

- How do we deine emotions
- How do we manipulate emotions in the lab? in animals? in humans?

Questions

- Recognition of emotions?
- Expression of emotions

James lange theory of emotion

- Perception of stimulus .. physiological
- Change...Perception of physiological

- Change... Emotion
- Thus the perception of a physiological change evokes the different emotions
- Supporting evidence :
    - Different brain ECG activity associated with different emotions
    - Subtle physiological changes among the different emotions
    - Also if we attempt to mimic an emotion we may actually experience it
    - Empathy: when we see emotional expression on another individual, we may experience the emotion
    - Mirror neurons\

Common bard theory

- Physiological changes r slow. onset of emotions if fast

Schascters 2 factor theory

- Interaction of thinking(cognition) and feeling
- to experience emotion, one must (1) be physically aroused and 2 cognitivly label the arousal
- Implication: arousal gives fuel to an emotion
- Arousal can intesnify virtually any emotion
- arousal can alter interpretation of the emotion
- Spillover effect: occurs when arousal from one event affects our response to other events

Arousal-Autonomic NS

- Emotions.. physiological arousal provided by the autonomic nervous system
- Sympathetic :increases in energy
- Parasym: decreases energy

Arousal and performance

- Easy autonomic tasks demand higher arousal

Expression of emotions

- Emotions vary along 2 dimensions:
- Valence (positive, negative)
- Some emotions are “simple” and basic : fear, anger, joy, sorrow, disgust
- others are more complex: guilt, shame, and deception
- Facial expressions is important for certain emotions
- Facial muscles