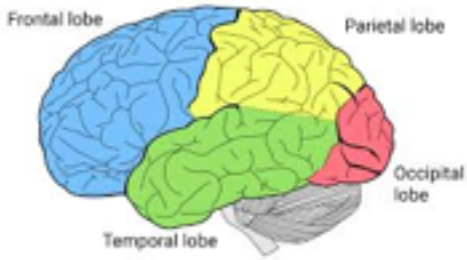


Biological influences

Roles of the four lobes of the cerebral cortex

Three Regions of the brain

- Hindbrain: Base of the brain near the back of the skull
• Brainstem: which controls vital activities of which we have no conscious control (heart rate, breathing)
• Cerebellum: Coordinating voluntary movement

- Midbrain: top of the brainstem under the cerebral hemispheres, receives messages from senses except smell and sends them to higher brain regions and receives replies that directs to places such as the cerebellum

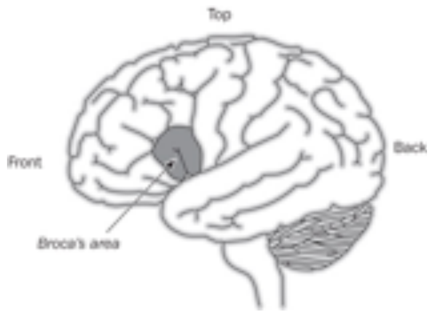
- Forebrain: largest part of the brain, major role in how we think, feel and behave,
• consists of limbic system, thalamus and hypothalamus and outer layer is the cortex (2 hemispheres joined together by a thick band of fibres called the corpus callosum which lets messages be sent from one hemisphere to the other)
• Thalamus: sensory relay station, controls autonomic functions
• Hypothalamus: regulates autonomic functions via hormones, include eating, sleeping, sexual activity

Hemispheres

- Left hemisphere: gets sensory information from the right side, controls movement on the right side of the body (verbal functions,speaking, reading, writing, maths)
- Right hemisphere: receives sensory information from the left side of the body and controls the left side of the body (non verbal functions, puzzles, maps, creativity, spatial tasks)
- Cerebral cortex: the wrinkling of the cortex rather than size defines humans and determines intelligence

Four Lobes

- hemispheres of the cortex can be further divided into lobes, which are defined by cracks (or fissures) in the cortex and has different functions
• Frontal lobe
• Parietal lobe
• Occipital lobe
• Temporal lobe



Frontal Lobe

- Characterised by the primary motor cortex and Broca's area
- It is the largest lobe behind your forehead
- Associated with thinking, decision making, feeling, higher mental ability, attention, personality, the control of emotions, expression of emotional behaviour and the control of movement
- Performs a coordinating role as it is the final place for a lot of sensory information that is received and processed elsewhere in the brain

- Primary motor cortex (rear of each frontal lobe) controls voluntary bodily movements through skeletal muscles attached directly to the bones e.g hand, arm, leg back and facial muscle (left controls right and right controls left)

- Broca's area: left frontal lobe has a crucial role in the production of speech, coordinating muscles required for speech and supply this to the motor cortex areas, involved with the meaning of words and structure of sentences, parts of speech such as adjectives and conjunctions and grammatical structure of a sentence (a person with damage to Broca's area has difficulty producing speech but they can understand language)
• Case study: Phineas Gage, damage to Frontal lobes: personality may change and capacity for reasoning and problem solving is reduced

- Paul Broca described two patients who had lost their speech and whose brains he examined after their deaths, he found both patients has a common area of damage to the third frontal convolution of the left hemisphere, he concluded that this brain controlled speech
- The deficit in language production is known as Broca's aphasia, the reasons for the language loss are not completely clear and may be different in different patients

Parietal Lobe
- Sits behind frontal lobe on top of cortex
- Is responsible for bodily sensations mainly touch and other skin sensations such as temperature and pain
- Is involved in spatial awareness and some aspects of speech

- The "parietal association cortex"
- enables individuals to read, write and solve mathematical problems
- The association areas: all the areas of the cerebral cortex that do not have a specialised sensory or motor function, they integrate information received from difference brain areas and structures to enable complex behaviours
- Damage to the parietal lobe in the right hemisphere is loss of imagery and visualisation of spatial relationships and the neglect of left-side space and left side of body
- Damage to this lobe in the left hemisphere results in problems in maths, reading and writing (association cortex)
- The sensory inputs from the right side of the body go to the left side of the brain and vice versa as with other neural and sensory systems

- The "primary somatosensory cortex"
- Parallel to the primary motor cortex separated by a fissure
- It receives and processes sensory information from the skin and body
- It allows us to perceive bodily sensations, touch, pressure, temperature, muscle movement

Occipital Lobe
- Sits directly behind and below the parietal lobe and is primarily responsible for vital functions of the eyes
- It has to provide very quick responses to the visual environment

- The "primary visual cortex" is located in the occipital lobe and this region of the brain receives visual input from the retina, here visual signals are interpreted in the occipital lobe, involved in both visual perception and colour recognition y
- Damage to this lobe can lead to different types of visual problems, for example full or partial blindness, or words blindness (experienced in conditions known as alexia and agraphia)
- Because of its location, this lobe is not prone to accidental damage

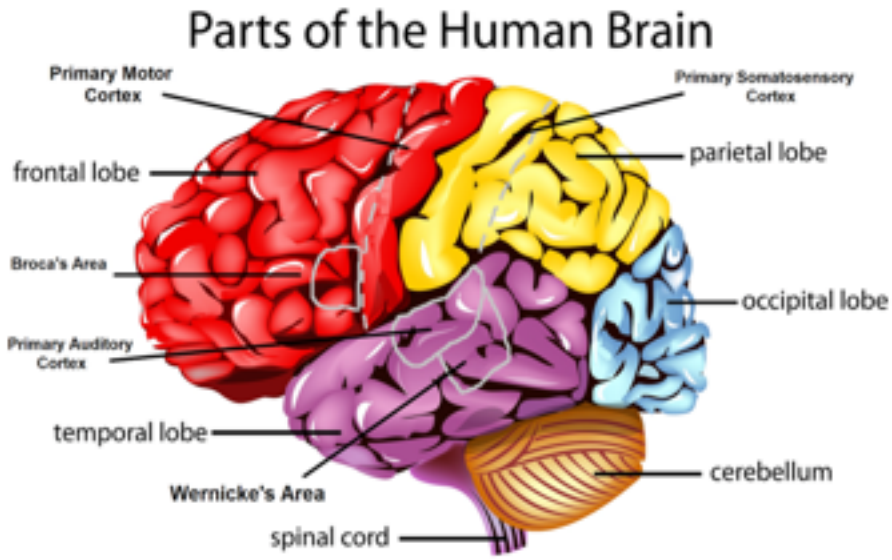
Temporal Lobe
- Located at the base of the cortex and is important in auditory perception such as hearing, as well as language and speech production and memory
- It receives information from the ears and interprets different sounds the ears hear

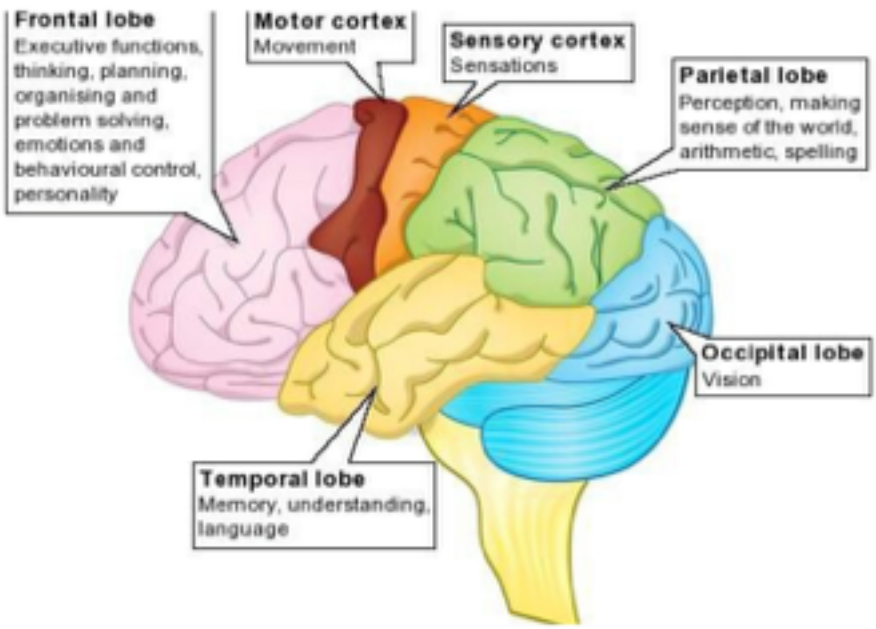
- "Primary auditory cortex" deals with the first step in hearing when sounds first reach the brain
- Structures like the limbic system, the amygdala and the hippocampus are located inside the temporal lobes
- The limbic system: emotions, long term memory and sense of smell
- The amygdala: process emotions
- The hippocampus: memory and spatial navigation

Wernicke's Area

- This area is inside the temporal lobe and is linked to the Broca's area as both are involved in speech production, it is named after Carl Wernicke, who proposed a link between he left upper temporal lobe and mimicking of words and syllables associated with the images of spoken words
• Wernicke's aphasia: Describes a condition in which language comprehension is impaired while speech production remains relatively normal, in other words, receptive language is impaired

- The Wernicke's area: is involved in speech production, but comprehends speech, interpreting sounds of human speech, understands words and locates appropriate words from memory to express intended meanings when we speak or write
• damage to Wernicke's area can produce sounds/ phrases/ word sentences (but without meaning but has difficulty in understanding language (semantic processing/ language recognition/ language interpretation)





Structure and function of the nervous system

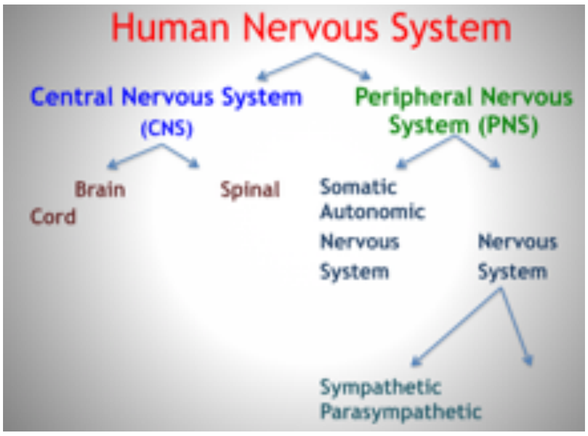
- Much work of Psychologists who are interested in the functions of the brain is conducted on animals rather then humans (Ethics)
- Monkeys, cats, rats and mice are common experimental animals
- Knowledge about our visual system, sensory receptors, sleep, attention, temperature regulation, reproductive behaviour, avoidance behaviour and stress comes from animals

- Human brain has advanced corticalisation (Enlargement of the cerebral cortex) compared to animals
- Humans have cortical localisation which means there are specific behavioural functions that are located in specific areas of the human brain
- Researchers use various scanning techniques to gain an understanding of how the brain works
- Researchers have also studied people who have sustained damage to their brain either by accident or disease

- Neuropsychological tests study complex cognitive functioning to see what behaviours have been affected (i.e stoke) also brain activity while people are engaged in normal living activities such as read, speaking, eating etc
- Scans that show brain damage can lead to hypotheses about behavioural effects

- Case studies are used to study brain function but can not be generalised to others
- The brain is plastic and sometimes a nearby brain area can take over the functions of a damaged area and may have the effect of masking the behavioural consequences of an injury

- Cognitive neuroscience uses behavioural, psychophysical, electrophysiological and brain imaging techniques to investigate the links between the brain, cognition and behaviour



Central nervous system

<u>Central nervous system- brain</u>

- The nervous system is divided into 2 parts: CNS and the PNS
- CNS is the brain and spinal column and the PNS is everything else
- The brain is divided into the forebrain, cerebellum and the brainstem
- Forebrain is the uppermost part of the brain and consists of the cerebrum and limbic system, thalamus and hypothalamus

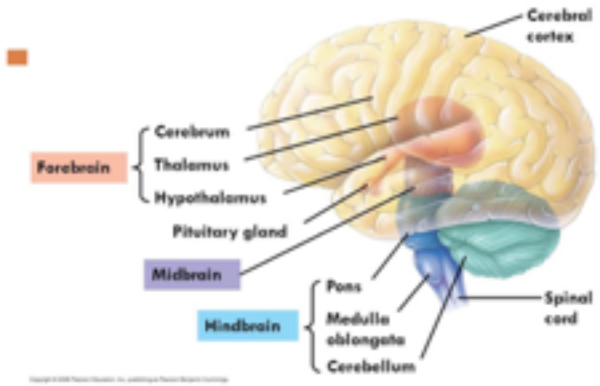
- In general the outer brain areas are involved in perception, learning motor and conceptual activities, areas near the centre of the brain are involved internal and automatic bodily functions such as body temperature, reproductive functions, eating, sleeping and emotions
- Cerebrum is associated mainly with the cerebral cortex which controls motor and mental activity

- Cerebrum is divided into right and left hemispheres which control different processes
- Right hemisphere: Visual imagery, emotions
- Left hemisphere: language processes

- Each hemisphere controls movements on the opposite side of the body e.g damage to the left brain may lead to difficulties with movement in the right arm and leg

- These effects on the opposite side of the body are termed "contralateral" which is contrasted to ipsilateral referring to being situated in or affecting the same side of the body
- Cerebellum: is responsible for motor control and body balance therefore damage to this can result to ataxia, which is unsteady walking and shaking

- Brainstem: the lowest part of the brain and connects the brain with he spinal chord, has 4 parts (midbrain, the pons, reticular system and medulla oblongata)
• Midbrain: top of brainstem and relays messages via the thalamus to the rest of the forebrain, important in vision, hearing, muscular movement (parkinson's disease part of the midbrain has degenerated resulting in tremors)
• Pons: at the front of brainstem and is responsible for eye movements, chewing and facial expressions
• Reticular system: neurons that extend from the top to the bottom of the brainstem and lead into the thalamus important in sleep and arousal (epilepsy may involve an abnormality of the reticular system)
• Medulla oblongata: Is the lower half of the brainstem continuous with spinal cord, links with the pons and deals with heart rate, breathing and blood pressure
• Brainstem includes: breathing, sleeping patterns, hunger and thirst, blood pressure, heart rhythms and body temp, helps regulate the CNS



Central nervous system- Spinal cord
- Spinal cord runs down from the brainstem and is a thoroughfare for messages between the brain and the rest of the body
- There are both neurons that transmit information via impulses away from the brain (efferent or motor neurons) and those that transmit towards the brain (afferent of sensory neurons)

- The spinal cord is organised into 31 segments, with sensory nerves leading in that the dorsal (back) side of each segment and motor nerves exciting from the ventral (abdominal) sides
- Between the 2 sides is grey matter and surrounding this matter are the neural pathways that characterise humans

- The PNS originates in the 31 pairs of spinal nerves and the 12 pairs of cranial nerves that leave the brainstem at the top of the spinal chord
- Most of these nerves combine both sensory and motor functions, leading both to and from the brain, although there are functional differences in spinal nerves when they meet the cord, at this point they split into a dorsal root that has sensory functions and a ventral root that has only motor functions. The discovery of this split, nearly 200 years ago, prompted much work into spinal reflexes

- Cranial nerves carry sensory input from the skin or motor output to the muscles of the head and face. They also carry sensory information for vision, hearing, smell and balance
- The effect of injury to the spinal cord depends on where the damage is done
  - In paraplegia, the lower part of the cord is damage resulting in the lower parts of the body being paralysed
  - In quadriplegia, the upper part of the spinal cord is damaged, resulting in the arms and legs being paralysed

Peripheral nervous system
- PNS is further subdivided into the somatic and autonomic parts
  - somatic: Nervous system is the system of nerves communicating information from the sense organs to the CNS and motor messages from the CNS to the muscles
  - Autonomic: refers to the nerves connected to the heart, glands and smooth muscles such as the digestive system and reproductive organs and tells the brain what is going on in these largely involuntary systems

<u>PNS- Somatic Nervous system</u>
- Somatic nervous system is important for monitoring bodily functions
- It receives sensory information from organs such as skin, ears and eyes and communicates information via the sensory nerves to the CNS
- It also carries messages from the CNS along nerves to enable the muscles to move voluntarily

- Different sensations that you experience involuntarily such as birds singing, light going on etc are communicated by your somatic nervous system through your spinal cord to your brain
- Typing, sending a text message, taking a selfie e.g perforating a task involuntarily, are sent from your brain down your spinal cord to you muscles that performs these tasks such as muscles in your arms, fingers and face

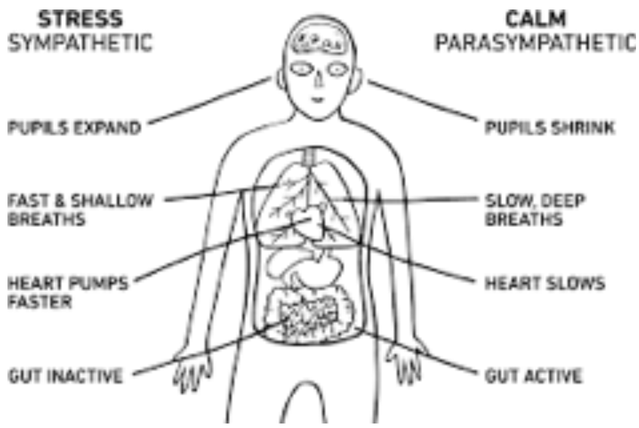
<u>PNS- Autonomic nervous system</u>
- Refers to neurons that transmit messages between the brain, via the spinal cord, and he smooth muscles found in the heart, lungs, blood vessels and glands
- It regulates involuntary body organs
- Autonomic nervous system is further subdivided into the sympathetic an parasympathetic systems
  - Sympathetic: manages the body in times of stress (fight-flight response)
  - Parasympathetic: Takes over for the normal day to day living and maintains normal bodily functions

- These two systems sometimes seems to work in opposite directions in relation to the same body organs
  - Sympathetic: arouses the body to perform, act and react while the parasympathetic system works to maintain and conserve energy

- Sympathetic:
  - In an emergency the sympathetic nervous system activates bodily systems to react to a threat, crisis or disaster e.g rapid heart beats, faster breathing, expanded lung capacity which allows you to increase the oxygen to the brain and muscles, your mouth will go dry and pupils dilate to increase field vision
  - They are your flight-fight responses
  - Anxiety for doing a class presentation is a type of arousal that involves the sympathetic nervous system
  - Extreme heightened arousal can lead to impaired performance
  - Long-term arousal can lead to mental problems and exhaustion

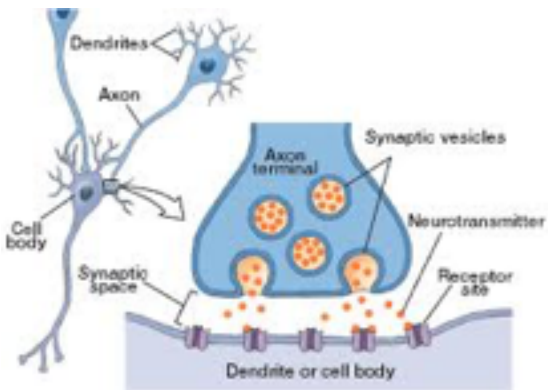
- Parasympathetic:
  - Parasympathetic calms the body down to maintain and conserve energy, it slowly returns your body to normal functioning, heart rate goes down, breath normally and start to salivate again
  - It also assists when eating such as salivation and stomach contractions

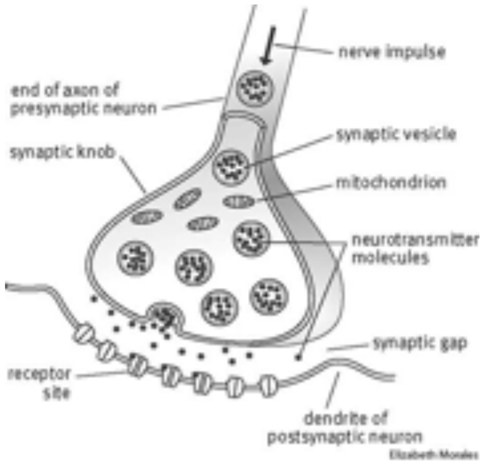
- These 2 systems work together to make sure that the automatic and voluntary behaviours are carried out



- The nervous system compromises of neurons which are the building blocks of physiological psychology which tries to explain how neurons working with one another bring about behaviour in humans (and animals)

Neural Transmission
- Neurons: Nerve cells of the brain transmit information to each other
- Models of synaptic transmission rely on chemical balances in the cell and electrical transmission of impulses through the neuron





<u>Structure of the Neuron</u>
- Cell body (soma): Determines if neuron will be activated and will transmit messages to other neurons, contains nucleus, has extensions (2 types are dendrites and axons)
- Dendrites: Detects and receives neural information
- Axons: transmits messages from the soma to other neurons or to cells in the body including muscles, organs and glands
- Myelin Sheath: Is a fatty covering that helps to insulate the axon form other axons or neurons, assists with speedy transmission of nerve impulses

<u>Role of the synapses</u>
- Cell body- protrudes dendrites and an axon
- Are tiny (measured in microns) 1/1000 mm up to several millimetres
- Cell bodies and dendrites are similar as they are both covered in synaptic knobs that receive information as electrical impulses
- Axons work to conduct impulses away from the dendrites and towards the synaptic knobs that form the next junction in the neural circuit

- Neurons are filled with a fluid known as cytoplasm in which are suspended the nucleus and different basic cell structures composed of folded membranes full of ribonucleic acid (RNA)

- RNA regulates the synthesis of proteins and other substances that maintain cell and transmit substances that are released to other cells to excite of inhibit them
- Cells work by firing under chemical and electrical triggers (spontaneous action is possible)

- Neurons will fire repeatedly if input is maintained
- Synapses: excited by activity can also be inhibited through activity that decreases cells firing- if not we would be in constant state of neural activity
- Electrically charged molecules, ions, are found in and around nerve cells
- Some have positive charge and some have a negative
- The resting potential of a nerve cell is its electrical change when doing nothing

- Impulses from other neurons alter the resting potential and if the message is strong then the cell will trigger or fire
- Humans- trigger point is 50 millivolts (millivolt is about one thousandth of a volt) this is where a nerve impulse or action potential moves down the axon and sodium ions enable the channels of the axon membrane to open- this happens all the way down the axon
- Action potential is an all-or-nothing event impulse happens completely or not)
- So while the nerve impulse is mainly electrical it requires chemical activity to transmit to other neurons

- Synaptic gap: each neuron is separated from the next neuron by a tiny gap
- Synapse: the point of communication between the neurons, includes the synaptic gap and a small area of the membrane of each of the connecting neurons
- Synaptic transmission: relies on chemical balances in the cell and electrical transmission of impulses through the neuron
- Motor neurons: control muscle contraction, have a cell body on one long end, long axon in the middle and dendrites on the other end
- Sensory neurons: have dendrites on both ends and are connected by a long axon with a cell body in the middle
- Synapse: the point of communication between neurons

Summary
- Electrical impulse: Electrical impulses within a neuron are called an Action Potential. When there is a resting potential of -70mv and action potential can be transmitted. When a stimulus reaches the threshold potential the impulse will travel (all or nothing response)
- Chemical impulse: Whereas the chemical impulse is when an action potential reaches the axon terminal, the transmitters in vesicles will fuse to the synaptic knob and be released into the synapse. The neurotransmitters will then be taken into receiving dendrite by receptors. Any left over neurotransmitters will be broken down by enzymes or taken back into the axon terminal (re-uptake)

<u>Role of Neurotransmitters</u>
- Neurotransmitter: are those chemicals that enable activity to travel across the synaptic gap between neurons
- Dopamine: a common neurotransmitter is involved in learning, attention and pleasurable sensations, the degeneration of the neurons that produce dopamine in one area of the brain causes Parkinson's disease- tremors, rigid movements and poor balance
- Serotonin: a common neurotransmitter involved in sleep an mood, a deficit of serotonin has been linked to depression, drugs like Prozac increase the availability of serotonin in some brain regions
- Noradrenalin: Helps the body deal with danger or threat as well as being important in memory retrieval, dysfunction is associated with mental disorders, especially depression
- Endorphins: Regulate our feelings and perceptions of pain, are out body's natural pain killing drugs and are manufactured and released when stressed, they are also released when a person is in a positive mood

• The runners 'high' associated with running by athletes is caused by a rush of endorphins

Factors that affect behaviour, emotion and thought

The role of genetics- heredity

- genetics influence a person before they are both
- e.g intelligence, physical growth, timing of development
- Genes may have an effect on how we think, behave and act

Genetics

- Heredity factors influence us from conception
- At conception a zygote is formed as a result of the sperm penetrating the lining of the ovum (egg). When sperm finally penetrates the wall of the egg, chemical changes occur in the wall immediately blocking other sperm. The genetic material is released and becomes the new cell called the zygote.
- The zygote contains the 'recipe' that directs the development of the cell into a human
- • Male: XY
- • Female: XX

Chromosomes

- The development of the cell into human is determined by the chromosome
- There are 46 thread-like chromosomes which consist of thousands of genes (23 pairs)
- Chromosomes occur in matched pairs with one exception
- The exception is 23rd pair which are the sex chromosomes- determine whether the zygote will be male or female

Mitosis

- The zygote develops from a single cell to a person through the process of mitosis
- In this process, the zygote divides into 2 cells, each of which also split and so on until billions of cells are formed.
- • Just before each division, the cell duplicates each set of chromosomes, which move in opposite directions within the cell. As each new cell gets half the chromosomes.

Meiosis

- Meiosis: the process where a cell divides, producing sperm or ova that each contain half the parent cell's original number of chromosomes. (Chromosome pairs cross and break, exchanging genetic material)
- This means that each chromosome is combined in different ways to the original one. When the cell splits, only one of the pair goes to each new cell, resulting in a sperm or egg that only has 23 chromosomes. When a sperm and egg unite, the resulting zygote has the full set of 46 chromosomes

What do genes do?

- The genes we have inherited guide how we develop physically
- Genes determine:
- • physical appearance such as eye colour, skin colour
- • Development such as when teeth first appear, growth spurts, puberty and menopause

Genes

- Our genes provides the receipt for our development but our environment affects the outcome
- e.g a child who inherits genes or being tall may not turn out to be tall if he or she has inadequate nutrition for a prolonged period in early life
- Heredity sets limits but environment determines how things turn out within those limits
- Epigenetics: the study of the transmission of information from one generation to the next through genetic inheritance that affects the traits of the offspring without alteration of the DNA or alteration that occurs from environmental factors

- Experience like child neglect or drug use are examined to see if they or other stressors can create epigenetic changes to the brain's neurons without altering the DNA

- Recent studies into cognitive epidemiology, a related field of inquiry that looks at the heritability of intelligence, have shown that semen and intelligence are related (Arden et al, 2009) and that genetics can influence children's drawing, which in turn is related to intelligence 10 years later (Arden et al, 2014)

Heredity and the Environment
- Our environment influences our development
- Heredity sets the limits but our environment determines how things will turn out within those limits

Environmental influences on behaviour and development
- What can impact development?
• Inadequate nutrition
• lack of education, no opportunity for education
• Drug and or alcohol consumption by mother during pregnancy
• Trauma
• Natural disasters

Nature VS Nurture
- The nature nurture controversy is the extent to which out development is influenced by genetic information (nature) from our parents and how much is the result of environmental influences both physical and social in our world (nurture)
• e.g early enrichment= higher brain mass and better learners

Hormones
- Our genetics play a role in regulating the production of hormones
• e.g thyroid problems can be genetic, 'in the family'
- Hormones: chemical messengers produced by the endocrine glands (endocrine system is the hormone system in the body)
- Hormones travel through the bloodstream and affect other parts of the body, such as the brain
- When they act on our brain, they influence our interest in food and sex, influence our moods and affect our growth
- Hormone messages are slow

Adrenal Glands
- Adrenal glands: The hormones prepare us to deal with emergency situations and trigger the 'fight or flight response'

- Adrenaline: Hormone produced by the adrenal glands during high stress or exciting situations called "fight or flight" responses, it increases the heart rate, increases blood pressure and breathing and prepares the muscles for exertion (e.g car accident, a fight, public speaking)
• Adrenaline rush: can give you strength in your body (some have lifted cars off bodies of children), heightened senses (from your vision to your touch) or a sudden boost of energy

- Noradrenaline: serves a vigilance function keeping us alert, hormones act as a neurotransmitter in our nervous system, it increases blood pressure and heart rate, it helps to regulate the stress response, it is responsible for controlling attention and responsiveness in the brain
• low levels- difficult staying awake and concentrating and paying attention to tasks
• high levels- can mirror symptoms of overdose: nervousness, cold hands and feet, high blood pressure, racing thoughts
• Dysfunction of noradrenaline is associated with mental disorders especially depression

Thyroid Glands
- thyroid glands: produce the hormone thyroxin which is necessary for the brain and nervous system to develop properly
- If babies are born with thyroxin deficiency that is not noticed and quickly treated, they will become intellectually deficient

- Those who develop thyroxin deficiency after the brain has developed do not suffer in the same way but they grow more slowly

Pituitary glands
- pituitary glands: our most important gland, because it triggers the release of hormones from all other glands, produces the growth hormone that stimulates body growth and development of body's cells
- Children lacking this hormone will grow and are usually properly proportioned but by adulthood they reach only about 130cm in height (Tanner, 1990)
- The pituitary gland also plays a role in the changes that occur at puberty, time of sexual maturation
- The pituitary gland stimulates a girl's ovaries to produce oestrogen and a boy's testes to produce more testosterone
- This change in the body's chemistry is a factor in explaining the 'teenage' behaviour such as moodiness, emotional etc
- Hormones are a chemical which affects how we think, feel and act

Psychoactive drugs
- Drugs are chemicals and similarly to hormones, drugs affect the chemistry of the body and changes behaviour
- Drugs can influence how people behave think and feel

Types of Drugs
Depressants
- Depressant: these are 'downers; that calms the activity of the nervous system nd slows bodily functions
- e.g alcohol, heroin is a narcotic/opiate, morphine is opiate
- Effects of alcohol:
• Lowers inhibitions
• reduces feelings of self consciousness
• promotes relaxation
• disinhibition: normally placid people becoming aggressive
• Affects motor control
• slows body's response

- Effects of heroin:
• opiates mimic endorphins, the body's painkillers altering reactions to pain by reducing the brain's perception of pain
• Heroin creates a feeling of euphoria followed by feelings of calmness and peacefulness
• Withdrawal unpleasant side effects such as fevers, cramps and gastro-intestinal problems

- Physiological effect of depressants
• Reduced activity in the CNS
• decreased heart rate
• slower breathing
• reduced coordination

- Psychological effect of depressants:
• Feel less stressed/ calmer
• Relieves anxiety

Stimulants
- Stimulant: these are 'uppers' that excites the nervous system and arouses body functions
- e.g nicotine, caffeine, amphetamines (speed), cocaine, ecstasy, ice (meth)

- Effects of stimulants:
• Increased heart and breathing rates

- appetite decreases as blood sugar rises
- energy increases
- stay awake
- body speeds up- hence the name ‘speed’

- Effects of cocaine:
- elevate mood and produce a sense of euphoria
- larger and larger doses are required to maintain their effects
- increased mental alertness and self-confidence
- prolonged use of cocaine can result in a form of psychosis with auditory hallucinations and strange paranoid ideas

- Effects of Ecstasy:
- Heightened emotions and a feeling of connectedness with those around them
- Dehydration, and if this occurs when a person is dancing for long periods of time it can lead to overheating, increase in blood pressure and death

- Long term effects of ecstasy due to effect on brain serotonin:
- Deflated mood
- memory loss
- damage to immune system
- Kyle McCardle and Co, 2004- higher depression and difficulty in storing information in long term memory, easily distracted and less efficient at focusing attention on complex tasks
- Dafters, 2006: Difficulty in switching between tasks

- Effects of Ice or meth
- very intense high
- experience a feeling of exhilaration and increased arousal and activity levels
- More awake
- suppresses appetite
- receptors in brain are flooded with monoamines which are forms of a neurotransmitter, as more is taken these receptors can be destroyed and prolonged ice use can lead to a point when the user no longer feels pleasure without ice
- Prolonged use is associated with brain and mental health conditions, such as memory loss, depression and psychosis
- Affect social and family relations and lead to financial problems

- Physiological effects of Stimulants:
- speed up activity in the CNS
- increase heart rate
- rapid breathing

- Psychological effects of stimulants:
- increased feelings of excitement
- higher energy level
- increased confidence

<u>Hallucinogens</u>

- Hallucinogens: A mind altering drug that changes perceptions and gives sensory images without input from the senses
- e.g marijuana, LSD, Magic mushrooms, ecstasy (both hallucinogen and stimulant)

- Effects of hallucinogens
- Reduce inhibitions
- increased sensitivity to colours, tastes and smells
- heightened emotions

- dehydration
- overheating
- blood pressure increase
- death
- euphoria with intense, pleasant images to one of absolute terror and panic
- The drug user’s mood and expectations can affect the nature of the trip

- Physiological effects:

- Increased heart rate
- increased blood pressure
- increased body temperature
- blurred vision
- dilated pupils
- convulsions/seizures

- Psychological effects:

- disrupted cognition
- altered perceptions
- distorted sense of time
- hallucinations
- mood swings
- dissociation
- depersonalisation