

Biopsychology

Dualism - Mind and body are completely different but interact together to give a sense of awareness Descartes

Dual-Aspect Theory - Mind and body are same thing but on different wavelengths Spinoza

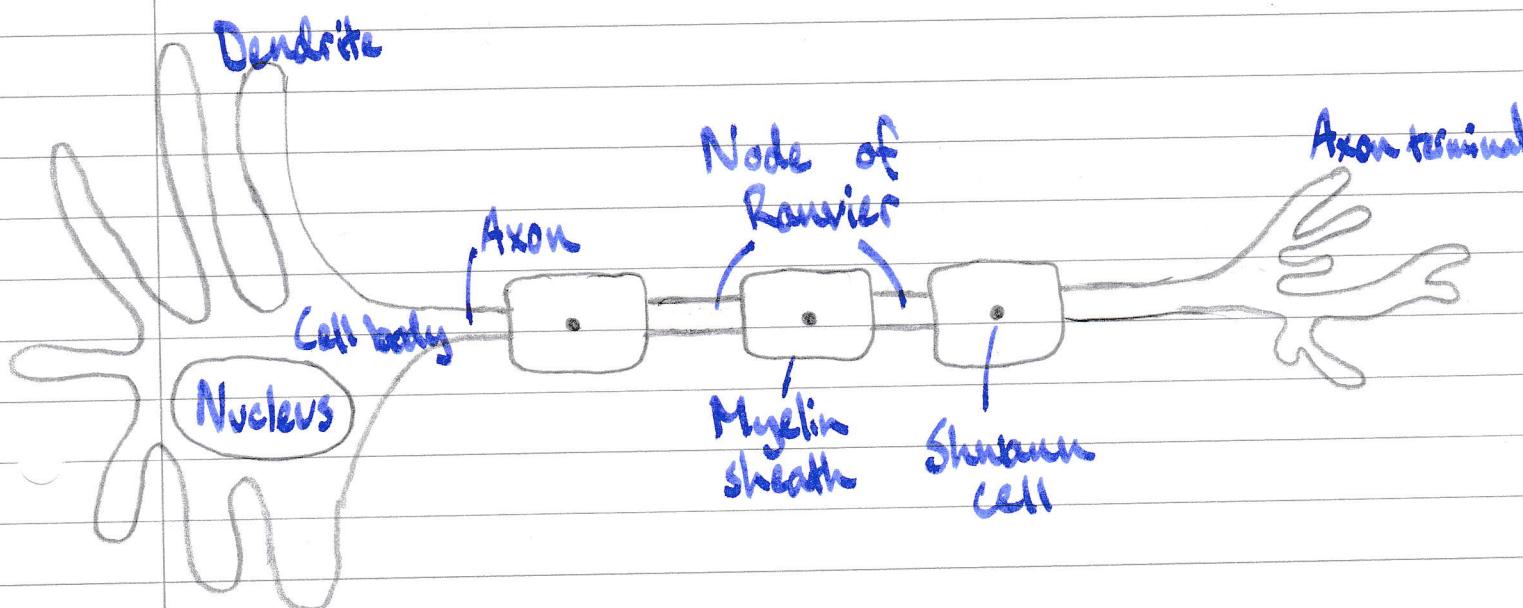
Reductionism - Mind can be explained by biology

Phrenology - Different parts of the cortex serve different functions
Different personality traits make size and bumps different Franz Gall

Neuron - Transmits information via nervous system

Gliai cells - Keeps neurons stable by getting rid of its waste, insulating the neuron and providing nutrients
Positive correlation as ↑ glial cells, ↑ intelligence

Structure of Neuron



Dendrite - outer fibres that receive information from other neurons

Axon - Transmits messages through neuron can be long, brain → toes

Myelin Sheath - insulator so signal transmits faster

Node of Ranvier - "speedbumps" so signal isn't transmitted too fast

Schwann cell - Produces myelin

Axon terminal - sends messages to a different neuron

Demyelination of motor neurons result in muscle/memory loss

How neurons communicate

1) Neurons receives signals. Some telling to "fire", some "don't fire". Threshold is reached when more "fire" signals than "don't fire" signals

neurotransmitters

2) Threshold reached, action potential happens

a neural impulse that travels down the axon like a wave

3) Signal is passed from one cell to another. Jumps across the synaptic gap - junction between axon terminal and dendrite

Neurotransmitters - chemicals used to send signals across Synaptic gap

Reuptake - ends transmission of signal. Takes used chemicals back into neuron again

Agonists - ↑ neurotransmitters by ↑ production/release.

Blocks reuptake by copying neurotransmitter and binds to receptor sites

Antagonists - ↓ neurotransmitters by blocking receptor sites

Types of Neurotransmitters

Acetylcholine (ACh) - learning, memory, muscle movement

- Botulin: Antagonist, blocks release of ACh
Leads to paralysis/death
- Curare: Antagonist, blocks receptor sites of ACh
Leads to paralysis
- Black Widow Spiders Venom: Agonist, continuously releases ACh

Dopamine - Mood states, thought processes, physical movement

- L-Dopa: Agonist, ↑ production of dopamine
- Amphetamine: Agonist, ↑ release of dopamine from axon terminals
- Cocaine: Agonist, blocks reuptake of dopamine
Low levels = Parkinsons
High levels = Schizophrenia

Serotonin and Norepinephrine - levels of arousal, mood, mood disorders

Antidepressant drugs by blocking reuptake of serotonin

- Prozac
- Paxil
- Zoloft

GABA - main INHIBITORY neurotransmitter in nervous system

- Anti-anxiety drugs, Agonist

Epilepsy - lack of GABA, also Spastic Cerebral Palsy

Glutamate - main EXCITATORY neurotransmitter in nervous system

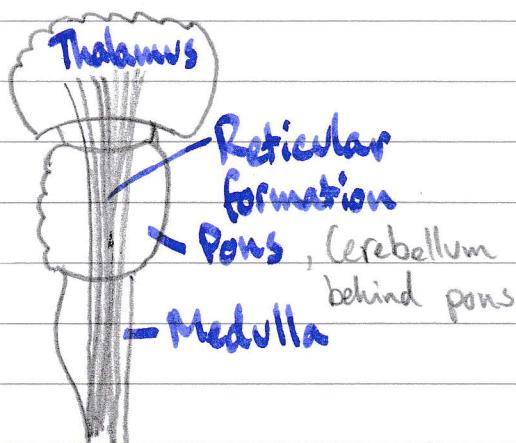
Memory storage, pain perception

Excessive glutamate == neuron death

Endorphines - Pain perception and relief

- Morphine, Agonists, ↑ endorphine activity
- Heroin

The Brain



Thalamus - "sensory center"

All senses except smell pass through
Sends messages from cortex to medulla
and cerebellum

Reticular formation

Enables alertness and filters sensory info

Medulla heartbeat, breathing

Controls basic functions

Pons

Coordinates automatic and unconscious movement

Cerebellum

- Coordinates voluntary movement
- Control emotions
- Judge time
- Implicit memory and conditioning stored
- Integrate multiple sources of sensory input
- Non-verbal learning

Limbic System check up image

Coordinates - emotions fear, aggression
- basic drives hunger, sex
- formation of episodic memories

Hippocampus small seahorse structure

- Processes conscious, episodic memories
- Works with AMYGDALA to form emotional memories

Amygdala small almond structure

- Helps process emotions can be stimulated to trigger fear/aggression

Hypothalamus lies below thalamus

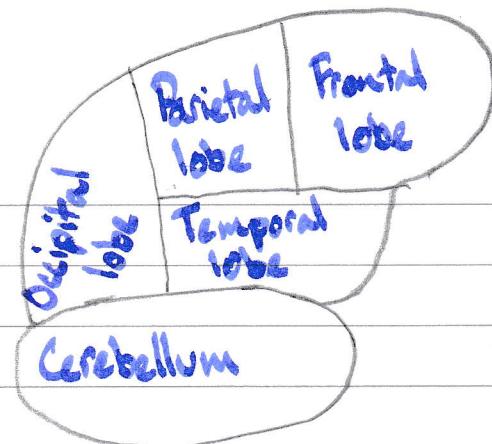
- Regulates • body temperature
- food and water intake
- sex drive

Stimulating hypothalamus can make one stop eating as it is more pleasurable

Cerebral Cortex

Occipital lobe.

Contralateral processing
for sight



Parietal lobe

Receives senses :
• Touch
• Taste
• Temperature

Frontal lobe

- Speaking
- Muscle movement
- Making plans and judgements
- Broca's area
- Speech production
- Language processing

Temporal lobe

Auditory processing

Also - hippocampus

- Wernicke's area language

Researching the Brain

Issues with Neuromethods - costly

- foreign substance invasiveness
- spatial resolution how close able to get to area
- temporal resolution pinpointing when neurons fire

EEG - Electrodes measure brain's electrical activity. Study seizures and sleep
Poor spatial resolution, great temporal resolution

TMS - Sends electrical impulses to disrupt communication between neurons

PET - Injected with isotopes to tag specific chemicals
Reveal size, shape, function of brain. Detect damaged areas

Diagnose dementia

MRI - Magnetic pulse to disrupt brain's activity spinning.
Computer reads energy to create image and reveal brain structure

Functional MRI - reveals brain's activity. Determining location, not timing
Multiple images taken to show changes in levels of oxygen in bloodflow

atom's

Stop spinning,
release energy

The Nervous System

Central Nervous System - Brain and Spinal cord

- makes decisions for the body

Peripheral Nervous System - Rest of nervous system

- gathers and sends information around body

Interneurons - exists within central nervous system

Sensory neurons - information from CNS to sensory receptors

Motor neurons - carries movement commands from CNS to body

eyes
glands
muscles

Central Nervous System

Peripheral Nervous System

Autonomic

- controls self-regulated action of internal organs and glands

Somatic

- controls voluntary movements of muscles

Sympathetic

arousing

Fight or Flight response

Parasympathetic

calming

Rest and Digest response

Adrenal glands release hormones

- adrenaline

epinephrine

noradrenaline

norepinephrine

cortisol

↑ Heart rate

Blood pressure \Rightarrow Energy

Blood sugar

Endocrine System

- sends messages through

- produces hormones

Pituitary gland - master gland of ^{endocrine} system

- controlled by hypothalamus

(thyroid)

- produces hormones that regulate other glands

growth hormone, oxytocine