

Knowledge Map: Brain and Neuropsychology

This topic looks at the structure and function of the brain and nervous system, its link to emotion, and its study in the field of cognitive neuroscience.

Memory	Perception	Development	Research methods	Social influence	Language thought and communication	Brain and neuropsychology	Psychological problems
--------	------------	-------------	------------------	------------------	------------------------------------	---------------------------	------------------------

The James-Lange Theory of emotion	Hebb's theory of learning	Penfield's study of the interpretive cortex	Tulving's gold memory study
-----------------------------------	----------------------------------	---	-----------------------------

Structure and function of the nervous system

The basics of the nervous system.

Structure of the nervous system
The nervous system Collects and responds to information. Coordinates organs including the brain.
Subdivisions CNS and PNS PNS = ANS + SNS ANS = sympathetic and parasympathetic CNS = brain and spinal cord

Autonomic nervous system
Homeostasis Keeping the internal body conditions in a stable state. Particularly applies to temperature control.
Sympathetic nervous system Physiological arousal, triggered when stressed – leads to fight or flight response.
Parasympathetic nervous system Produces the rest and digest response.

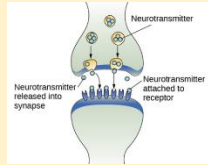
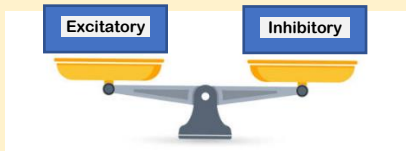
Functions of the nervous system
Central nervous system Right hemisphere controls the LHS of the body. Left hemisphere controls the RHS of the body. Conscious awareness and decision making carried out by the brain. Brain stem carries out autonomic functions.
Peripheral nervous system Peripheral nervous system carries information about our world to the CNS and then the information from the CNS to the muscles.
Autonomic nervous system Functions that we do not consciously control such as heart rate, breathing, digestion.
Somatic nervous system Voluntary movement of muscles and reflex responses. Controls messages to and from muscles and sensory organs.

The fight or flight response
Brain detects threat Hypothalamus identifies threat (stressor). Sympathetic division of the ANS triggered.
Adrenaline ANS changes from parasympathetic to sympathetic. Stress hormone released into the bloodstream.
Fight or flight Heart rate increase, digestion decrease, pupils dilate.
Rest and digest Parasympathetic nervous system takes over once the threat has passed.

Neuron Structure and function

Explaining how information moves around the body and brain.

Neurons
Types of neurons Sensory: from PNS to CNS. Long dendrite - short axon. Relay: Connects sensory to motor. Short dendrite – short axon. Motor: From CNS to muscles/glands. Short dendrite – long axon.
Structure of neurons Cell body: Nucleus containing DNA Axon: Carries signals, covered in myelin sheath which helps signal and protects the neuron. Myelin sheath: Fatty covering of axon with gaps, insulate neuron and speeds up signal. Terminal Button: End of axon, part of the synapse.
Firing Negative charge – resting state Charge changes causing neuron to fire – action potential

Synapses
The Synapse
 <p>Terminal button-Synaptic Cleft-Receptor Electrical signal causes vesicles to release neurotransmitter into synaptic cleft. Neurotransmitter in synaptic cleft attaches to receptor sites. Chemical message turns back into an electrical signal. Remaining neurotransmitter is reabsorbed.</p>
Excitation and inhibition Excitatory neurotransmitter increases postsynaptic neurons positive charge and makes it more likely to fire. Inhibitory neurotransmitters increases postsynaptic negative charge and makes it less likely to fire.
Summation
 <p>More Excitatory than inhibitory factors cause the neuron to fire.</p>

Knowledge Map: Brain and Neuropsychology

This topic looks at the structure and function of the brain and nervous system, its link to emotion, and its study in the field of cognitive neuroscience.


Memory	Perception	Development	Research methods	Social influence	Language thought and communication	Brain and neuropsychology	Psychological problems
--------	------------	-------------	------------------	------------------	------------------------------------	---------------------------	------------------------

The James-Lange Theory of emotion	Hebb's theory of learning	Penfield's study of the interpretive cortex	Tulving's gold memory study
-----------------------------------	----------------------------------	---	-----------------------------

Structure and function of the brain

Different parts of the brain control specific aspects of our behaviour

Structure and function of the brain
<u>Two hemispheres – 4 lobes</u> Cerebral cortex divided into 4 lobes.
<u>Frontal lobe (Including Broca's area) – motor area</u> Front of brain – thinking, planning and motor area controls movement. Broca's area plays a part in remembering and forming words.
<u>Parietal lobe, contains somatosensory area</u> Behind the frontal lobe, Somatosensory area is where sensations are processed.
<u>Occipital lobe, contains visual area</u> Rear of the brain, controls vision.
<u>Temporal lobe, contains auditory/language area (Including Wernicke's area)</u> Behind frontal lobe and below parietal lobe. Auditory are related to speech and learning. Wernicke's area plays a part in recognising language.

Localisation of function in the brain
<u>Motor area</u> Damage to the left hemisphere affects our movement on the RHS of our bodies. Damage to the right hemisphere affects out movement on the LHS of our bodies.
<u>Somatosensory area</u> Most sensitive parts of the body take up most space. Damage means less ability to feel pain.

<u>Visual area</u> Damage to the left hemisphere affects the RHS of our vision. Damage to the right hemisphere affects the LHS of our vision.
<u>Auditory</u> Damage can lead to deafness.
<u>Language area</u> Usually in the left hemisphere only. Broca's area plays a part in remembering and forming words. Wernicke's area plays a part in recognising language.

An introduction to neuropsychology

Scientific study of the influence of brain structures on mental processes

Cognitive neuroscience
Aims to create a detailed map of localised functions in the brain.
<u>Structure and function of the brain relates to function</u> Frontal lobe and motor area – movement Temporal lobe and amygdala: processes emotion and aggression.
<u>Structure and function of the brain relates to cognition</u> Different types of memory
<u>Occipital lobe, contains visual area</u> Rear of the brain, controls vision.

Neurological damage
<u>Localisation</u> Cerebral cortex divided Damage to certain areas of the brain affect certain areas/behaviours.
<u>Stroke</u> When brain is deprived of oxygen areas of the brain die leading to effects on behaviour unless other areas take on the functions.
<u>Neurological damage & motor ability</u> Damage to motor area affects fine and complex movement.
<u>Behaviour</u> Broca's aphasia: problems producing speech. Wernicke's aphasia: problems understanding speech.

Scanning techniques	
<u>CT Scan</u> Takes lots of X-rays of the brain which are combined.	Quality is higher than tradition X-ray Only produces still images High levels of radiation
<u>PET Scan</u> Detects a sample of radioactive glucose that has been injected into the patient.	Shows brain in action and localisation of function Expensive Use of radiation may have ethical issues
<u>fMRI Scan</u> Measures blood oxygen levels and displays them as a 3D model.	Produces clear images without radiation Expensive Patient has to stay very still