



Knowledge Organiser: Year 13

Psychology; BIOPSYCHOLOGY

NERVOUS SYSTEM AND ENDOCRINE SYSTEM

1

Central nervous system: brain and spinal cord
Peripheral nervous system:

1. Autonomic Nervous System- governs vital functions

2. Somatic Nervous System= governs muscle movement and receives information from sensory receptors

- Endocrine system
- Glands and Hormones- distributed in the blood stream

NEURONS AND SYNAPTIC TRANSMISSION

2

Types of neurons: sensory, relay and motor neurons

Structure of a neuron: cell body contains nucleus and dendrites

Axon covered in myelin sheath divided by nodes of Ranvier

Positive charge leads to an action potential

- Neurotransmitters cross the synapse from vesicles. Neurotransmitters combine with receptors on the postsynaptic membrane.
- Stimulation of postsynaptic receptors by neurotransmitters result in either excitation or inhibition Excitatory: post synaptic neuron more likely to fire an impulse. Inhibitory: post synaptic neuron less likely to fire an impulse. Excitatory and inhibitory influences are summed.

LOCALISATION OF FUNCTION

3

The theory that different areas of the brain responsible for different functions.

- Frontal lobe: motor cortex / movement.
- Parietal lobe: somatosensory area / sensory.
- Occipital lobe: visual.
- Temporal lobe: auditory.
- Broca's area- Left frontal lobe / speech production
- Wernicke's area- Left temporal lobe / language comprehension.

EVALUATION

- Dougherty et al: Evidence from neurosurgery
- Functions are not localised to just one region, other regions take over following brain injury.
- Equipotentiality theory: higher mental functions are not localised.
- Biologically reductionist: reducing complex processes to one specific brain region

HEMISPHERIC LATERALISATION

SPLIT BRAIN RESEARCH

4

Hemispheric lateralisation: idea that the 2 hemispheres of the brain are functionally different.

- Left hemisphere: language centre of the brain, controls the right hand & receives information from right visual field.
- The right hemisphere: focuses on visuo-spatial tasks, controls the left hand & receives information from the left visual field.

Sperry: split brain research, participants who had a surgical procedure of commissurotomy . left hemisphere is dominant in terms of visual speech and language. Right hemisphere is dominant in terms of visualmotor tasks.

EVALUATION

- Identified advantages of lateralisation: increases neural processing capacity, Rogers et al.
- Lateralisation may occur in young adults.
- Language may not be restricted to the left hemisphere: Turk et al.

PLASTICITY AND FUNCTIONAL RECOVERY OF THE BRAIN AFTER TRAUMA

5

Brain plasticity: brain has the ability to change throughout life e.g. synaptic pruning and new neural connections.

- Maguire: experience (driving a taxi) can change the structure of the brain (enlarged hippocampus).
- Draganski: learning induced changes in the brains of medical student—in the posterior hippocampus, following final exams. • Functional recovery: form of plasticity, brains ability to redistribute or transfer functions. Structural changes can include: axonal sprouting, reformation of blood vessels, recruitment of homologous areas

EVALUATION

- Supporting evidence to support brains considerable plasticity: Khun et al.
- Supporting evidence for functional recovery: Tajiri et al.
- Plasticity is greater in children than adults
- Real world: neurorehabilitation

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WAYS OF STUDYING THE BRAIN

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Functional magnetic resonance imaging: (fMRI) uses magnetic field and radio waves to monitor blood flow when a person performs a task.

😊 high spatial resolution.

X low temporal resolution.

Electroencephalogram (EEG): measures electrical activity within the brain via electrodes that are fixed to an individual's scalp using a skull cap—detecting neuronal activity.

😊 high temporal resolution.

X low spatial resolution.

Event related potentials: (ERPs) similar equipment to EEG—key difference = stimulus is presented to a participant and researcher looks for activity related to the stimulus.

😊 Possible to determine how processing is affected by specific experimental manipulation.
X Poor spatial resolution.

Post-mortem examinations: analysis of a person's brain following their death e.g. Broca's brain.

😊 allow for a detailed analysis of the brain.

X lack validity as there are neuronal changes, confounding influences (e.g. drug treatment, age)

BIOLOGICAL RHYTHMS

Circadian rhythms

- 24 hour cycle. Example: sleep/wake cycle.
- Sleep/wake cycle: driven by body clock, synchronised by the suprachiasmatic nuclei (SCN). Light = primary input.
- Siffre study: 2 months underground, sleep/wake cycle increased by lack of external cues.

EVALUATION

- Support for importance of light: Aschoff et al
- Practical applications to shift work.
- Does not account for individual differences: Duffy et al.

Infradian and Ultradian rhythms

Infradian rhythms: less than one cycle in 24 hours. Menstrual cycle about 28 days, governed by hormones (oestrogen/progesterone).

Exogenous zeitgebers synchronise cycle, menstrual cycles synchronised using pheromones from armpits (Stern and McClintock).

EVALUATION

Evolutionary basis: synchronisation may have adaptive function. Methodological limitations: many factors affect menstrual cycle.

Ultradian rhythms: more than one cycle in 24 hours. Sleep: 90 minute cycle of 5 stages. 1&2 light sleep, alpha waves and sleep spindles. 3&4 deep sleep, slow wave sleep, delta waves. 5 REM sleep (dreams), theta waves.

EVALUATION

- Supporting evidence for distinct stages of sleep (Dement et al).
- Individual differences & 'sleep lab' generalisability

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ENDOGENOUS PACEMAKERS AND EXOGENOUS ZEITGEBERS

Endogenous pacemakers (EPs) & the sleep/wake cycle.

- Primary EP: suprachiasmatic nucleus (SCN), receives information about light from optic chiasm.
- SCN indicates day length to pineal gland which secretes melatonin when dark. Sleep/wake cycle stopped in chipmunks when SCN destroyed.

EVALUATION

Supporting evidence for importance of SCN: Ralph et al. Need to look beyond the 'master clock': Damiola et al.

Exogenous zeitgebers (EZs) and the sleep/wake cycle. Time givers': reset EPS by entrainment.

- Light the key EZ, entrains SCN to 24 hours, even via backs of knees (Campbell et al).
- Social cues: babies circadian rhythms and jet lag entrained by bedtimes and mealtimes.

EVALUATION

- Supporting evidence: Skene et al, blind people with some light perception have normal circadian rhythms those without have abnormal circadian rhythms.
- Case study: man blind from birth with sleep/wake cycle of 24.9 hours could not adjust despite social cues (Miles et al).

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