CHAPTER 3

The Bases of Human Behaviour

CBSE Class 11 · Psychology · Chapter 3

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WHAT THIS CHAPTER DOES

A Describe the neuron and trace how a nerve impulse is transmitted.

B Map the nervous system (CNS vs PNS) and the autonomic divisions (sympathetic vs parasympathetic).

Boards prep that builds confidence, not anxiety.

TODAY'S MISSION

Today's mission

1. Describe the neuron and trace how a nerve impulse is transmitted.
2. Map the nervous system (CNS vs PNS) and the autonomic divisions (sympathetic vs parasympathetic).
3. Name the brain regions and the four lobes, and the endocrine glands and their hormones.
4. Explain heredity, the nature-nurture interaction, and the culture triad — and score 7/8 on this chapter.

WHY THIS MATTERS

Why this chapter matters

1. It explains the MACHINERY of behaviour — the brain, nerves, hormones, genes and culture that produce everything we think and do.

2. Worth 6-8 marks of the annual paper, much of it easy diagram and definition marks.

3. It is the bridge between biology and psychology: every later chapter on emotion, learning and motivation rests on the systems you meet here.

TOPIC

A

The evolutionary perspective

TOPIC

Behaviour as a product of evolution

WHAT EVOLUTION MEANS

Evolution refers to the gradual, orderly biological changes by which a species develops from its earlier forms in response to the changing demands of its environment. These changes are extremely slow, becoming visible only across hundreds of generations. The

THE EVOLVED HUMAN BRAIN

A defining feature of modern humans is a large, highly developed brain with an expanded capacity for cognition — perception, memory, thinking, reasoning and language. Crucially, the brain is LAYERED by evolutionary age: the oldest structures (the brain stem,

ADAPTATION AND BEHAVIOUR

From the evolutionary view, many behaviours exist because they once helped our ancestors adapt and survive. The 'fight or flight' arousal before a threat, the bonding between parent and infant, and our readiness to learn language are all evolved tendencies with adaptive

TOPIC

B

The neuron and the nerve impulse

TOPIC

The nerve cell and how it signals

STRUCTURE OF A NEURON

The neuron is the basic unit of the nervous system — a specialised cell that receives, processes and transmits information. It has three main parts. The DENDRITES are short, branch-like fibres that RECEIVE signals from other neurons. The CELL BODY (soma) contains the nucleus and

THE NERVE IMPULSE

A nerve impulse is an electro-chemical signal. When a neuron is stimulated strongly enough, a wave of electrical change travels along it in a fixed direction: DENDRITE -> CELL BODY -> AXON. This impulse is 'all-or-none' — it either fires fully or not at all, like a switch. The myelin

THE SYNAPSE

Neurons do not physically touch; between them lies a microscopic gap called the SYNAPSE. When the electrical impulse reaches the axon terminal, it triggers the release of chemical messengers called NEUROTRANSMITTERS, which diffuse across the synapse and bind to the dendrites of the next

FROM SIGNAL TO BEHAVIOUR

The neuron is the building block that makes the whole nervous system work. Sensory neurons carry information from the sense organs to the central nervous system; interneurons process it; and motor neurons carry commands out to muscles and glands,

THEOREM · LOAD-BEARING RESULT

How a nerve impulse travels

> "Within a single neuron the impulse flows DENDRITE -> CELL BODY -> AXON; it then crosses the SYNAPSE to the next neuron by releasing chemical NEUROTRANSMITTERS.

STATEMENT

The impulse is ELECTRICAL within a neuron (all-or-none, sped up by the myelin sheath) and CHEMICAL across the synaptic gap, where neurotransmitters carry the signal from the axon terminal

WHY THIS MATTERS

- This electro-chemical relay is how every message in the body travels — from sensing a stimulus, to processing it in the brain, to producing a behavioural response.

WATCH OUT FOR

NOTE Never reverse the direction (axon -> dendrite within one neuron), and never let the impulse 'jump' electrically between neurons — it must cross the synapse chemically via neurotransmitters.

TOPIC

C

The nervous system — CNS and PNS

TOPIC

How the nervous system is organised

CENTRAL NERVOUS SYSTEM

The CENTRAL nervous system (CNS) consists of just two structures: the BRAIN and the SPINAL CORD. It is the command centre — the brain processes information, makes decisions and stores memory, while the spinal cord carries messages between the brain and the body and

PERIPHERAL NERVOUS SYSTEM

The PERIPHERAL nervous system (PNS) is everything OUTSIDE the brain and spinal cord — the network of nerves that connects the CNS to the limbs, organs, muscles and skin. It carries sensory information INTO the CNS and motor commands OUT to the

SOMATIC VS AUTONOMIC

Within the PNS, the SOMATIC system handles the actions you do on purpose — lifting your hand, walking, speaking — and relays what your senses detect. The AUTONOMIC system, by contrast, runs automatically and is normally NOT under conscious control: it governs breathing

THE SPINAL CORD AND REFLEXES

The spinal cord is not just a cable. It can produce REFLEX actions — rapid, automatic responses to a stimulus — without waiting for the brain. When you touch something hot, sensory neurons signal the spinal cord, which immediately sends a motor command to withdraw your hand;

TOPIC

D

The structure of the brain

WORKED EXAMPLE

Hindbrain, midbrain, forebrain

1. HINDBRAIN (oldest, at the base): the MEDULLA controls vital functions such as breathing, heartbeat and blood pressure; the PONS bridges brain regions and aids sleep; the CEREBELLUM controls balance, posture and the coordination of movement.

2. MIDBRAIN (small middle region): relays sensory and motor signals between the hindbrain and forebrain and controls some visual and auditory reflexes.

3. FOREBRAIN (largest, most recently evolved): contains the CEREBRUM (thinking, memory, voluntary action), the THALAMUS (a relay station for sensory information), and the HYPOTHALAMUS (controls hunger, thirst, body temperature, sleep and the endocrine system).

4. Remember the order base-to-top and old-to-new: Hindbrain -> Midbrain -> Forebrain. cerebeLLum = baLLance (hindbrain); cerebrum = thinking (forebrain).

TOPIC

The cerebral cortex and its four lobes

FRONTAL LOBE

The FRONTAL lobe sits at the front of the cerebral cortex and is the seat of our highest mental abilities: thinking, planning, reasoning, decision-making, judgement and the control of voluntary movement (through its motor area). It is also central to personality and self-control. Damage to

PARIETAL LOBE

The PARIETAL lobe lies behind the frontal lobe and processes BODILY SENSATIONS — touch, pressure, temperature and pain — through its somatosensory area, which maps the surface of the body. It also helps with spatial awareness, telling you where your limbs are and where objects are in relation to

TEMPORAL LOBE

The TEMPORAL lobe is located on the side of the brain, roughly behind the temples and above the ears, and is mainly concerned with HEARING (its auditory area), with the understanding of LANGUAGE, and with aspects of MEMORY. It helps you recognise sounds and words and store experiences. A

OCCIPITAL LOBE

The OCCIPITAL lobe sits at the BACK of the brain and is devoted almost entirely to VISION — its visual area receives and interprets signals from the eyes, letting us see colour, shape, motion and depth. Damage here can cause blindness even when the eyes are healthy, because the information cannot be

TOPIC

E

The autonomic nervous system

TOPIC

Sympathetic vs parasympathetic

WHAT THE AUTONOMIC SYSTEM DOES

The AUTONOMIC nervous system is the part of the PNS that governs the body's INVOLUNTARY internal activities — those normally outside conscious control, such as heartbeat, breathing, blood circulation, digestion, salivation, sweating and emotional

SYMPATHETIC DIVISION

The SYMPATHETIC division is the body's EMERGENCY system, the one that prepares us for 'FIGHT OR FLIGHT'. When you face a threat or strong stress, it springs into action: the heart beats faster, breathing quickens, the pupils dilate, the muscles tense, digestion slows, and the adrenal glands pour out

PARASYMPATHETIC DIVISION

The PARASYMPATHETIC division does the OPPOSITE of the sympathetic: it CALMS the body and conserves energy once the emergency has passed — the 'REST AND DIGEST' system. It slows the heart rate, deepens and slows breathing, constricts the pupils, and stimulates

WHY THE BALANCE MATTERS

The sympathetic and parasympathetic divisions form a self-regulating partnership: one accelerates, the other brakes, keeping the body in balance (homeostasis). A healthy autonomic system arouses you appropriately for a challenge and then

TRY IT · SOLVE BEFORE YOU PEEK

A student's heart is pounding, palms are sweating and pupils are dilated just before going on stage. Which division of the autonomic nervous system is active, and what is its general role?

SOLUTION

ANSWER The SYMPATHETIC division is active. It is the body's emergency 'fight-or-flight' system: it speeds up the heart, dilates the pupils, and releases adrenaline to prepare the body for action under stress. Afterwards the PARASYMPATHETIC division will calm the body back down.

TOPIC

F

The endocrine system

TOPIC

Chemical control of behaviour

THE PITUITARY — MASTER GLAND

The endocrine system is a network of GLANDS that release chemical messengers called HORMONES directly into the bloodstream to influence behaviour slowly but powerfully. The PITUITARY gland, a tiny structure at the base of the brain, is called the MASTER gland because

THYROID AND METABOLISM

The THYROID gland, located in the neck, secretes the hormone THYROXIN, which regulates the body's METABOLIC RATE — how fast it converts food into energy. The right amount of thyroxin keeps energy, growth and weight in balance. Too little (hypothyroidism) can

ADRENAL GLANDS AND EMERGENCIES

The ADRENAL glands sit on top of the kidneys and are the body's emergency chemical responders. They release ADRENALINE (epinephrine), which works hand-in-hand with the sympathetic nervous system during 'fight or flight' — speeding the heart, raising blood sugar

GONADS AND OTHER GLANDS

The GONADS are the sex glands — the testes in males and ovaries in females — which secrete the sex hormones (testosterone, and oestrogen and progesterone) that govern reproduction, the development of secondary sexual characteristics at

TOPIC

G

Heredity and the nature-nurture debate

TOPIC

Genes, environment and their interaction

GENES AND HEREDITY

HEREDITY is the transmission of physical and psychological characteristics from parents to offspring through GENES. Genes are units of inheritance made of DNA and carried on CHROMOSOMES; humans receive 23 chromosomes from each parent. Genes influence not

THE NATURE-NURTURE DEBATE

The NATURE-NURTURE debate asks whether behaviour is determined by HEREDITY (nature — the genes we are born with) or by ENVIRONMENT (nurture — upbringing, learning, culture). Historically psychologists argued for one side, but the modern view

HOW NATURE AND NURTURE INTERACT

A useful way to picture the interaction: genes might give a child the POTENTIAL to be tall or musically gifted, but good nutrition, training and a supportive environment determine whether that potential is realised. The same predisposition can

TOPIC

H

The cultural and socio-cultural bases

TOPIC

Enculturation, socialisation, acculturation

CULTURE AND BEHAVIOUR

Alongside biology, CULTURE is a powerful base of behaviour. Culture is the shared way of life — the beliefs, values, customs, language and practices — of a group, passed from one generation to the next. It shapes how we dress, eat, greet, express emotion and even think. Because

ENCULTURATION

ENCULTURATION is the process by which a person learns the practices, values and beliefs of their OWN culture. It happens largely in CHILDHOOD and is mostly informal and unconscious — children absorb their culture's language, food habits, festivals and norms simply by living

SOCIALISATION

SOCIALISATION is the broader process by which individuals acquire the knowledge, skills and dispositions that enable them to function as effective members of society. Unlike enculturation (specifically about absorbing one's culture), socialisation is about learning the ROLES, rules and

ACCULTURATION

ACCULTURATION refers to the cultural and psychological CHANGES that result from sustained CONTACT between two or more DIFFERENT cultures — for example, when a family migrates to another country. Individuals may adopt the new culture's language, dress or customs while

TOPIC

Central vs peripheral nervous system

TRAP → TRUTH

× **MISTAKE** The central nervous system includes all the nerves of the body, including those in the arms and legs.

✓ **CORRECT** The CENTRAL nervous system (CNS) is ONLY the brain and the spinal cord. All the nerves that branch out to the limbs, organs and skin form the PERIPHERAL nervous system (PNS). The PNS in turn divides into the somatic (voluntary) and autonomic (involuntary) systems. Confusing the two costs marks in every nervous-system question.

TOPIC

Sympathetic vs parasympathetic

TRAP → TRUTH

× MISTAKE The parasympathetic nervous system is what prepares the body for an emergency / fight-or-flight.

✓ CORRECT It is the SYMPATHETIC division that arouses the body for emergencies ('fight or flight') — raising heart rate, dilating pupils, releasing adrenaline. The PARASYMPATHETIC division does the OPPOSITE: it calms the body and conserves energy ('rest and digest') after the emergency passes. Anchor: Sympathetic = Stress/Speed-up; Parasympathetic = Peace/calm-down.

TOPIC

Master gland

TRAP → TRUTH

× **MISTAKE** The brain (or the hypothalamus alone) is the master gland of the body.

✓ **CORRECT** The PITUITARY gland is called the MASTER gland because it secretes hormones that control the activity of several OTHER endocrine glands (thyroid, adrenals, gonads). It is itself directed by the hypothalamus, but the gland that earns the 'master' title in the syllabus is the pituitary. Writing 'thyroid' or 'adrenal' here is a guaranteed lost mark.

TOPIC

Forebrain regions

TRAP → TRUTH

× **MISTAKE** The cerebellum is part of the forebrain and is responsible for thinking and reasoning.

✓ **CORRECT** The CEREBELLUM is part of the HINDBRAIN and controls balance, posture and the coordination of movement — NOT higher thinking. Thinking, reasoning, memory and voluntary action are functions of the CEREBRUM / cerebral cortex in the FOREBRAIN. Students routinely swap cerebrum (forebrain, thinking) with cerebellum (hindbrain, balance) — keep them apart by the spelling cue 'cerebeLLum = baLLance'.

TOPIC

Neuron structure and impulse direction

TRAP → TRUTH

× **MISTAKE** A nerve impulse travels from the axon to the dendrites within a single neuron.

✓ **CORRECT** Within ONE neuron the impulse flows in the order DENDRITE -> CELL BODY -> AXON, and then crosses the SYNAPSE (via neurotransmitters) to the dendrite of the NEXT neuron. The dendrites RECEIVE and the axon SENDS. Reversing this direction is a common diagram error that loses the 'flow' mark in labelled-neuron questions.

TOPIC

Nature-nurture debate

TRAP → TRUTH

× **MISTAKE** Behaviour is caused either entirely by heredity (genes) or entirely by environment — it must be one or the other.

✓ **CORRECT** Modern psychology rejects the either/or framing. Behaviour is the product of an INTERACTION between heredity (nature — genes, temperament) and environment (nurture — upbringing, culture, learning). Genes set a range of possibilities; the environment determines where within that range a trait actually develops. Always present it as interaction, not a contest.

TOPIC

Enculturation vs acculturation

TRAP → TRUTH

× **MISTAKE** Enculturation and acculturation mean the same thing — learning a culture.

✓ **CORRECT** ENCULTURATION is learning the practices and values of one's OWN culture, usually in childhood, without deliberate teaching. ACCULTURATION is the cultural and psychological CHANGE that results from CONTACT between two DIFFERENT cultures (e.g. migrating to another country). SOCIALISATION is the broader process of learning to be a functioning member of society. Enculturation = your OWN culture; acculturation = contact with ANOTHER culture.

TOPPER TEMPLATE · MARK-BY-MARK

3-4 mark question: 'Describe the structure of a neuron and explain how a nerve impulse is

1	**NAME THE PARTS OF THE NEURON** 1 m	Open by naming the three main parts: the DENDRITES (branch-like fibres that RECEIVE signals), the CELL BODY or soma (contains the nucleus and integrates the signal), and the AXON (the long fibre that CARRIES the impulse away, often covered by a myelin sheath that speeds conduction). Naming all three cleanly earns the anchor mark; a quick labelled sketch helps.
2	**TRACE THE IMPULSE WITHIN AND BETWEEN NEURONS** 2 m	Explain the flow: a stimulus generates an electrical impulse that travels DENDRITE -> CELL BODY -> AXON within the neuron. At the axon tip the impulse reaches the SYNAPSE — the tiny gap between two neurons — where it triggers the release of chemical messengers called NEUROTRANSMITTERS, which carry the signal across to the dendrites of the NEXT neuron. State the direction explicitly; reversing it loses the 'flow' mark.
3	**LINK STRUCTURE TO FUNCTION** 1 m	Close by stating WHY this matters: this electro-chemical relay is how the entire nervous system communicates — sensing the environment, processing it in the brain, and producing behaviour. Connecting the neuron to behaviour, rather than stopping at anatomy, is what lifts the answer to full marks.

TOPPER TEMPLATE · MARK-BY-MARK

5-mark question: 'Describe the structure of the human brain' / 'Explain the functions of the

1	**DIVIDE THE BRAIN INTO THREE REGIONS** 1 m	Begin with the broad map: the brain has three regions — the HINDBRAIN (medulla, pons, cerebellum: controls vital functions like breathing, heartbeat, and balance/coordination), the MIDBRAIN (relays sensory and motor signals, controls some reflexes), and the FOREBRAIN (the largest region, seat of higher functions). Naming all three with one function each secures the structural mark.
2	**DETAIL THE FOREBRAIN AND THE FOUR LOBES** 3 m	Zoom into the forebrain: the CEREBRUM, covered by the wrinkled CEREBRAL CORTEX, is the centre of thinking, memory and voluntary action, and is divided into four lobes — FRONTAL (thinking, planning, decision-making, voluntary movement), PARIETAL (touch, temperature, body sensation), TEMPORAL (hearing, language, memory), and OCCIPITAL (vision). Mention the thalamus (sensory relay) and hypothalamus (controls hunger, thirst, temperature and the endocrine system). One function per lobe is the mark-dense core of this answer.
3	**ADD THE HINDBRAIN DETAIL / LINK TO BEHAVIOUR** 1 m	Round off with the cerebellum's role in balance and coordinated movement and the medulla's control of life-support functions, then state that this layered structure — old survival centres beneath newer thinking centres — reflects the brain's evolution. The integrative closing sentence earns the final mark.

TOPPER TEMPLATE · MARK-BY-MARK

4-6 mark case-study / question: identify and explain enculturation, socialisation and

1	**IDENTIFY THE CORRECT CONCEPT FROM THE CUE** 1 m	Read the stem for the keyword. 'Learning one's own customs as a child' -> ENCULTURATION; 'learning to be a member of society / rules and roles' -> SOCIALISATION; 'change after contact with a new/foreign culture (migration)' -> ACCULTURATION; 'heart pounding / sweating before a threat' -> SYMPATHETIC nervous system; 'genes vs upbringing' -> nature-nurture. Name the concept first and clearly.
2	**DEFINE THE CONCEPT AND JUSTIFY WITH THE STEM** 2 m	Give the precise one-line definition, then quote the cue: 'Because the passage describes a family that moved abroad and began adopting the host country's food and dress, this is ACCULTURATION — psychological and cultural change resulting from contact between two cultures.' Tying the definition back to the evidence is where the application marks live.
3	**ADD A CONTRAST OR REAL-WORLD POINT** 1 m	Finish by distinguishing it from the nearest neighbour: 'This differs from enculturation, which is learning one's OWN culture in childhood.' For a biological stem, add the calming role of the parasympathetic system afterwards. Showing the contrast secures the final mark and demonstrates higher-order understanding.

PYQ PATTERNS

Top PYQ patterns to drill

#1	Draw/label a neuron and explain how a nerve impulse travels (dendrite -> cell body -> axon -> synapse). (3-4 marks)	Almost every annual + SQP
#2	Explain the divisions of the nervous system (CNS vs PNS; somatic vs autonomic), OR differentiate sympathetic and parasympathetic systems. (3-5 marks)	Annual + Pre-Board
#3	Describe the structure of the human brain	hindbrain, midbrain, forebrain — and the functions of the four lobes of the cerebral cortex. (5-6 marks) — SQP + School Annual
#4	Describe the endocrine system: name the major glands and their hormones; why is the pituitary called the master gland? (4-6 marks)	Annual + Pre-Board
#5		

RECAP · MEMORISE THESE

5-line revision

1. Biology — Neuron: dendrite -> cell body -> axon -> synapse (neurotransmitters). Nervous system: CNS (brain + spinal cord) + PNS (somatic + autonomic). Autonomic: sympathetic = arouse, parasympathetic = calm.

2. Brain & glands — Brain: hindbrain (cerebellum = balance), midbrain (relay), forebrain (cerebrum = thinking; lobes: frontal/ parietal/temporal/ occipital). Endocrine: pituitary = master gland; thyroid, adrenal, gonads.

3. Heredity & culture — Heredity = genes set a range; behaviour = nature x nurture INTERACTION. Culture triad: enculturation (own culture), socialisation (member of society), acculturation (contact with another culture).

WHAT'S NEXT

What's next

→ Chapter 4 — Human Development (how behaviour changes across the life-span, building on the biological bases learned here).

→ Sit the 15-MCQ Quick Drill (companion PDF) — under 20 minutes, target >= 12/15.

→ Then the full annual-pattern Paper — 30 marks, 60 minutes, real CBSE Class 11 pattern.

You now know the biology AND culture behind behaviour.

Lock in the diagrams, sit the drill, and beat the chapter.

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