

Learning and motivation

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1 Learning: nature, factors, curves, memory and transfer

Learning is a relatively permanent change in behaviour that comes from experience and practice (not from maturation, fatigue or drugs); how well it happens depends on the learner, the teacher, the material and the surroundings, it can be drawn as a learning curve, it is kept by memory and lost by forgetting, and what is learnt in one task can help or hinder another (transfer).

Core facts

- **Definitions (who said what, in short):**
 - **Woodworth:** any activity that develops the individual and makes his behaviour and experience different from what it would otherwise have been is learning.
 - **Gates:** learning is the **modification of behaviour through experience** (and training).
 - **Crow and Crow:** learning is the **acquisition of habits, knowledge and attitudes**.
 - **Kingsley and Garry:** the process by which behaviour is originated or changed through **practice or training**.
 - **Skinner:** learning is a process of **progressive behaviour adaptation**.
 - **Henry P. Smith:** acquiring new behaviour, or strengthening or weakening old behaviour, as a result of experience.
 - **Robert M. Gagne** (*The Conditions of Learning*): a change in human **disposition or capability** that **persists over time** and is not simply due to **growth**.
 - **Chris Argyris:** learning is the **detection and correction of error**.
- **Standard definition** (APPSC 2019): a **relatively permanent change in behaviour due to experience**; **experience** is the one thing every definition needs.
- **Characteristics of learning:** a **process**, not a product; **change of behaviour**; **universal** (all living beings learn); **continuous / lifelong** ("womb to tomb"); **purposeful and goal-directed**; comes from **experience and practice**; **relatively permanent**; helps **adjustment**; **transferable**; can be **positive or negative** (good or bad habits); **active** (the learner must take part).
- **Not learning:** changes from **maturation** (walking, puberty), **fatigue**, **illness**, **drugs** or **reflexes**.
- **Learning is inferred:** it cannot be seen directly; the teacher measures **performance** and judges learning from it.
- **Types of learning (BRAOU list of 7):** motor, verbal, concept, discrimination, learning of principles, **problem solving** (the **highest order**: needs thinking, reasoning, imagination) and attitude learning. **Concept learning** = **abstraction + generalisation**. **Verbal learning** is found **only in human beings**.
- **Factors that affect learning:**
 - **Learner:** health, age, **maturation and readiness**, intelligence, **motivation**, interest, attitude, aptitude, previous knowledge, emotional state, fatigue.
 - **Teacher:** mastery of subject, method, personality, behaviour with pupils, use of aids.
 - **Material (content):** meaningfulness, difficulty, length, organisation.

- **Environment:** physical (light, air, seating, noise) and social-emotional (home, peers, classroom climate).
- **Method of learning:** whole vs part, **spaced (distributed) vs massed**, recitation, learning by doing.
- **Learning curve:** a **graphical** picture of the progress of learning a task over time. X-axis: trials, days or practice time; Y-axis: amount learnt (score) (or errors and time, which fall).
- **Types of learning curve:**
 - **Convex** (negatively accelerated): fast gain at first, slow later; the **most common** (easy, familiar task).
 - **Concave** (positively accelerated): slow at first, fast later (new, difficult task).
 - **Linear** (straight line): equal gain every trial = **uniform progress**; rare.
 - **S-shaped / mixed:** slow, then fast, then slow again (long, complex skills).
- **Plateau:** a **flat stretch** in the learning curve where practice brings **no visible progress** for a while; first described by **Bryan and Harter** (1897, telegraph operators learning Morse code). The top limit beyond which no practice helps is the **physiological limit**.
- **Memory:** the psychological process of **acquiring (encoding), storing (retaining) and later retrieving** information (APPSC 2022); an organism's capacity to **retain and retrieve** information. **Ryburn** (1956): the power to store experiences and bring them back to consciousness later. **Storage** = retention of material in memory.
- **Four parts of memory** (Woodworth): **learning (memorising), retention, recall, recognition**.
- **Three stages (encoding → storage → retrieval) and three stores** (Atkinson and Shiffrin, 1968):
 - **Sensory memory:** under a second for sights (iconic), a few seconds for sounds (echoic);
 - **Short-term memory (STM):** about **20–30 seconds** without rehearsal, capacity **7 ± 2 items** (George **Miller**, 1956, "The magical number seven"); coded mainly by **sound (acoustic)**;
 - **Long-term memory (LTM):** very large and lasting; coded mainly by **meaning (semantic)**.
- **Hermann Ebbinghaus** (German): first experimental study of memory, ****On Memory, 1885 (1913 = English translation); used nonsense syllables (like ZOK, BIF) on himself; invented the savings (relearning) method; drew the curve of forgetting: forgetting is fastest just after learning**** (more than half in the first hour, about two-thirds in a day), then slows.
- **Measuring retention: recall, recognition, relearning (savings), redintegration.** Recognition is easier; recall is **rarely** superior to recognition. **Savings % = (original trials – relearning trials) ÷ original trials × 100** (10 trials, then 6 → 40%).
- **Theories of forgetting: decay / disuse** (traces fade; Thorndike's law of disuse); **interference** (**proactive:** old learning blocks new; **retroactive:** new learning blocks old); **repression / motivated forgetting** (**Freud:** painful memories pushed into the unconscious); **retrieval (cue-dependent) failure. Encoding failure** (never attended to, never stored) is not true forgetting. **Suppression = conscious** pushing away of a thought; repression is **unconscious**.
- **Transfer of learning:** the effect of learning one task on learning or doing another task.
- **Types of transfer:**
 - **Positive:** earlier learning helps (cycling helps scooter riding);
 - **Negative:** earlier learning hinders (driving on the left, then in a right-hand-traffic country);

- **Zero / neutral**: no effect;
- **Lateral (horizontal)**: to a task of the **same level** in another setting;
- **Vertical**: from a lower to a **higher-level** task (addition → multiplication);
- **Bilateral**: from one side of the body to the other (right-hand skill helps the left).
- **Theories of transfer:**
 - **Formal (mental) discipline**: based on **faculty psychology**; the mind is a set of faculties trained like muscles by hard subjects (Latin, mathematics); **John Locke** is linked to it; disproved by **William James** (1890) and **Thorndike and Woodworth** (1901).
 - **Identical elements**: **E.L. Thorndike** (with Woodworth, **1901**); transfer happens only as far as the two tasks share **identical elements** (content, method, attitude).
 - **Generalisation**: **Charles H. Judd** (**1908**); transfer comes from understanding a **general principle** (the **dart / underwater target** experiment on refraction).
 - **Transposition**: **Gestalt** psychologists (Köhler); transfer of **insight into relationships** (pattern) to new situations.
 - **Transfer of ideals / values**: **W.C. Bagley**; ideals such as neatness transfer when they are consciously taught as ideals.

Explained

1. What counts as learning. A child who touches a hot stove and then keeps away has learnt (experience changed behaviour). A child who starts walking at 12 months has **matured**, not learnt. A tired worker who slows down shows **fatigue**, not learning. Learning can be **good or bad**: a habit of copying homework is also learnt.

- **"All living is learning"**: a person's skills, habits, knowledge, attitudes and interests are all **products of learning**.
- **Habituation**: slowly ceasing to respond to a harmless stimulus that keeps repeating; the **simplest** form of learning, seen even in the **foetus** (by about **32 weeks**).
- **Learned helplessness** (Martin **Seligman**): learning that an unpleasant event can be neither avoided nor escaped, so the learner **stops trying**; repeated failure and harsh punishment in school can produce it.
- **Active vs passive learning**: in active learning the **learner controls** the experience (student-centred teaching); passive learning and direct instruction mark teacher-centred teaching.
- **Laws of association** (**Aristotle**): ideas are linked by **contiguity**, **similarity** (and contrast) and **frequency** (repetition); the later S-R theories grew from them.

2. Learning, maturation and readiness

Point	Maturation	Learning
Cause	inner growth (genes)	experience, practice, training
Training needed	no	yes
Example	sitting, walking, puberty	reading, cycling, manners
Teacher's role	wait for readiness	plan practice and guidance

Teaching before maturation is wasteful (Gesell's twin stair-climbing study); readiness = maturation + motivation + previous learning. Thorndike made **readiness** his first law (see EDU-LR-02).

3. Factors in the classroom

Factor	Helps learning	Hinders learning
Learner	motivation, interest, good health	fatigue, anxiety, hunger
Teacher	clear method, warmth, aids	dull lecture, fear
Material	meaningful, organised	long, unconnected lists
Environment	light, air, quiet, support	noise, crowding, conflict at home

For a hostel welfare officer the environmental list matters: regular food, sleep, study time and safety in the hostel are learning factors.

- **Material: meaningful** material is learnt fastest and kept longest; **pictures** are remembered better than words.
- **Method:** the **whole method** (learn it all at once) suits meaningful material, **lasting** memory and **older** learners; the **part method** (section by section) suits long, difficult material, **immediate** memory and **children below about 12**.

3a. The communication model of classroom learning. Teaching can be seen as communication: the teacher is the **source**, the lesson the **message**, speech, print or aids the **channel**, and the learner the **receiver**.

Variable	Belongs to	Examples
Source	teacher	expertise, clarity, warmth, credibility
Message	lesson	organisation, difficulty, examples
Channel	medium	lecture, textbook, chart, video
Receiver	learner	perception, retention, recall , attention, motivation

Processes that happen inside the learner (**perception, retention and recall**) are **receiver variables** (APPSC 2019).

3b. Verbal learning. Learning, keeping and recalling words and verbal material; it is **unique to human beings**. It may be **intentional** or **incidental**; learning time grows with the length of the material. Three laboratory methods: **paired-associate** learning (a stimulus word with its response word: foreign word and meaning), **serial** learning (a list in fixed order) and **free recall** (any order).

4. Reading a learning curve

- **Initial spurt:** fast early gain (novelty, easy parts first, high interest).
- **Gradual rise:** progress slows as harder parts come.
- **Plateau:** a level stretch; the learner seems stuck.
- **Final spurt / limit:** a rise again, and finally the **physiological limit**.
- If **errors** or **time per trial** are plotted instead of scores, the curve **falls** as learning improves.

- **Trial and error** (Thorndike's cats) gives a **gradual** curve; **insight** (Köhler's apes) gives a **sudden** drop in errors.

5. Plateau: causes and remedies

Cause	Remedy
loss of interest, boredom	new goals, variety, praise
fatigue	rest, spaced practice
wrong or faulty method	correct the method, guidance
moving from simple to higher-order habits (letters → words in typing)	patience; the plateau ends when the new habit forms
emotional problems, poor health	counselling, care

A plateau is a **temporary halt**, not the end of learning.

6. Kinds of memory

- **Rote (mechanical) memory**: repeating without meaning; quick to fade.
- **Logical (meaningful) memory**: learning with understanding; lasts longer.
- **Long-term memory types** (Endel **Tulving**, 1972, and later work): **episodic** (personal events: my first day at school), **semantic** (facts and meanings: Delhi is the capital), **procedural** (how to do things: cycling, typing). Episodic + semantic = **declarative (explicit)**; procedural = **non-declarative (implicit)**.
- **Working memory** (Baddeley and Hitch, **1974**): the active "desk" of STM where information is held and used. Parts: **phonological loop**, **visuospatial sketchpad**, **central executive**; Baddeley added the **episodic buffer** in **2000**.
- **Encoding** can be **acoustic**, **visual**, **tactile** or **semantic**. **Elaboration** (linking new information to what is already known) improves encoding.
- **Sensory memory**: large capacity, very short life; visual = **iconic**, auditory = **echoic**.
- **Chunking**: grouping items into familiar units (12 digits remembered as 3 years) so that more fits into STM.
- **Rehearsal: maintenance rehearsal** (rote repeating, as with a phone number until dialled) keeps information in STM briefly; **elaborative rehearsal** (relating it to what one knows) moves it into LTM.
- **Atkinson and Shiffrin's** three-store model is also called the **modal** or **multi-store** model; this **information-processing** view compares the mind to a **digital computer** (input → processing → output).
- **Hippocampus**: helps sort new experiences and pass them into LTM. **Engram** (memory trace): the assumed physical or chemical change in brain neurons that holds a memory.
- **Flashbulb memory**: a vivid "snapshot" of where one was on hearing shocking news; held with confidence but often **inaccurate**. **Autobiographical memory**: one's own life story, part of episodic memory.
- **Marks of a good memory**: rapid learning, long retention, quick recall, correct recognition, and being **useful at the right time**.

7. Measuring retention

Method	What the learner does	Notes
Recall	reproduces without cues (essay, fill the gap)	hardest
Recognition	picks the right one among options (MCQ)	easier than recall
Relearning / savings	learns the material again; time saved shows retention	Ebbinghaus; most sensitive
Reconstruction	arranges items back in the original order	
Redintegration	rebuilds a whole memory from a few cues	a whole song from its first notes

- **Savings example:** a list learnt in **16** trials is relearnt in **12** → $(16 - 12) \div 16 \times 100 = 25\%$ savings.
- **Recognition** gets harder when the wrong options are **very similar** to the right one and when there are **more** options.
- **Context effect:** recall is best when the testing place and mood **match** those of learning.

8. Forgetting explained

- **Decay:** what is not used fades (the law of disuse).
- **Proactive interference (inhibition):** an **old** phone number gets in the way of the **new** one.
- **Retroactive interference (inhibition):** studying history right after civics makes the **civics** (earlier) harder to recall. **Jenkins and Dallenbach (1924):** people who **slept** after learning forgot less than those who stayed awake, because there was less interference.
- **Repression** (Freud): unpleasant experiences are pushed out of awareness. Forgetting because we **want** to forget = repression (**motivated forgetting**); its **conscious** form is **suppression**.
- **Encoding failure:** most people cannot draw a coin they handle daily, because its details were **never encoded**.
- **Decay** fits loss from STM but fails for well-practised skills (**swimming**, cycling), which last without use.
- **Interference is greatest** when the two tasks are **similar**.

Design	Experimental group	Control group	Measures
Retroactive	learn A → learn B → recall A	learn A → rest → recall A	new blocking old
Proactive	learn A → learn B → recall B	rest → learn B → recall B	old blocking new

- **Amnesia: retrograde** = loss of memories from **before** an injury; **anterograde** = cannot form **new** memories after it (the main problem in Alzheimer's disease). **Infantile amnesia:** hardly anyone recalls events before about **age 3**.
- **Karl Lashley** (rat-maze lesion studies, 1929–1950): a memory is **spread across the cortex**, not stored in one spot.
- **Retrieval failure:** the memory is there, but the cue is missing (the "tip of the tongue" feeling).
- Forgetting is **normal and useful:** it clears unneeded details.

9. Ways to improve memory and reduce forgetting

- Understand first (logical learning beats rote).

- **Spaced (distributed) practice** beats massed (cramming).
- **Overlearning**: practise past the point of first mastery (about 50% extra practice helps retention); the **best assurance** for remembering material for an exam.
- **Expanding retrieval practice** (Landauer and Bjork, **1978**): test yourself with **gradually longer gaps**; even better than equal spacing.
- **Deep processing** (levels of processing, **Craik and Lockhart**, 1972): thinking about **meaning** gives stronger memory than attention to sound or look.
- **Whole method** for short, meaningful material; **part method** for long or difficult material.
- **Recitation** (self-testing) while learning; regular revision soon after learning, since loss is fastest early.
- **Association** and **mnemonics**: **acronym** (VIBGYOR for the colours of the rainbow), **acrostic** ("Every Good Boy Does Fine"), **method of loci** (items placed along a familiar route), **peg-word** system, **keyword** method, interactive images, grouping by category.
- **SQ3R** study method (Francis P. **Robinson**, *Effective Study*, 1946): Survey, Question, Read, Recite, Review. **PQ4R** (Thomas and Robinson): Preview, Question, **Read**, Reflect, Recite, Review (the first R is **Read**).
- Rest and sleep after study; good health and freedom from anxiety.

10. Serial position and incomplete tasks

- **Serial position effect**: in a list, the **first** items (**primacy**) and **last** items (**recency**) are remembered best; the middle is forgotten most.
- **Zeigarnik effect** (Bluma Zeigarnik, 1927): **unfinished** tasks are remembered better than finished ones.

11. Transfer: comparing the theories

Theory	Person, year	Key idea	Classroom meaning
Formal discipline	faculty psychology; Locke	train faculties like muscles	hard subjects "sharpen the mind" (rejected)
Identical elements	Thorndike and Woodworth, 1901	common elements transfer	teach skills close to real-life use
Generalisation	Judd, 1908	principles transfer	teach the rule, not only the case
Transposition	Gestalt (Köhler)	patterns and relations transfer	teach through insight and structure
Ideals	Bagley	consciously held ideals transfer	teach neatness, honesty as ideals

12. Transfer in the BRAOU texts. Thorndike and **R.S. Woodworth** (1901) first spoke of "**transfer of practice**"; **Bigge** (1967) defined transfer as learning in one situation influencing learning or performance in another. Examples: badminton → tennis (positive); left-hand-drive habit → right-hand-drive car (negative); history → driving (zero). **Mindful learning** (Ellen **Langer**) has five principles: **openness to novelty**, alertness to distinction, sensitivity to context, awareness of multiple perspectives, orientation in the present.

13. Teaching for transfer. Show links between subjects and life; teach general principles with many examples; give practice in varied situations; build meaningful understanding; make the learner aware of what can be transferred; avoid habits that will later cause negative transfer.

Common traps

✗ "Learning is any change in behaviour." ✓ Only change from **experience or practice**; changes from **maturation, fatigue, drugs** are not learning.

✗ "Learning is a product." ✓ It is a **process** (continuous, lifelong).

✗ "A plateau means the learner has reached the limit." ✓ A plateau is a **temporary** halt; the final limit is the **physiological limit**.

✗ "The most common learning curve is concave." ✓ The most common is **convex** (negatively accelerated: fast first, slow later).

✗ "A learning curve is a numerical table." ✓ It is a **graphical** depiction.

✗ "Proactive inhibition: new learning blocks old." ✓ That is **retroactive**; **proactive** = **old** learning blocks **new**. (The BRAOU Educational Psychology book swaps the two; follow the standard meaning given here.)

✗ "Recognition is harder than recall." ✓ **Recall** is harder; recognition (MCQ) is easier.

✗ "Ebbinghaus used meaningful words." ✓ He used **nonsense syllables**, on himself, 1885.

✗ "Identical elements theory: Judd." ✓ Identical elements = **Thorndike** (1901); generalisation = **Judd** (1908); ideals = **Bagley**.

✗ "Formal discipline is supported by modern psychology." ✓ It was **rejected** (James 1890; Thorndike and Woodworth 1901).

✗ "Bilateral transfer = transfer between two subjects." ✓ It is transfer from **one side of the body to the other**.

✗ "Recall is usually superior to recognition." ✓ Recall is **rarely** superior; recognition is easier and more sensitive.

✗ "STM is coded by meaning." ✓ STM is mainly **acoustic**; LTM is mainly **semantic**.

✗ "Ebbinghaus's On Memory appeared in 1913." ✓ **1885**; 1913 is the English translation.

✗ "Suppression is unconscious." ✓ **Suppression** is conscious; **repression** (Freud) is unconscious.

✗ "Anterograde amnesia = losing old memories." ✓ That is **retrograde**; anterograde = cannot form **new** ones.

✗ "Evaluation is a process of memory." ✓ Memory = learning (encoding), retention (storage), recall, recognition; **evaluation** is not one of them.

Quick revision

- Learning = relatively permanent change of behaviour by experience; Gates: modification through experience; Crow and Crow: habits, knowledge, attitudes.
- Factors: learner, teacher, material, environment, method (spaced > massed).
- Learning curve = graph; convex most common, concave for hard new tasks, S-shaped mixed.
- Plateau = flat stretch, temporary (Bryan and Harter, telegraphy); top = physiological limit.
- Memory = encoding, storage, retrieval; parts: learning, retention, recall, recognition.
- STM 20–30 s, 7 ± 2 (Miller 1956), acoustic; three stores: Atkinson and Shiffrin 1968.
- Ebbinghaus 1885: nonsense syllables, savings method, forgetting fastest at first.
- Proactive: old blocks new; retroactive: new blocks old; repression: Freud.
- Transfer: positive, negative, zero; lateral, vertical, bilateral.
- Formal discipline (rejected), identical elements (Thorndike 1901), generalisation (Judd 1908), transposition (Gestalt), ideals (Bagley).

2 Classical conditioning and Thorndike's connectionism

The behaviourist (S-R, association) theories explain learning as links between a stimulus and a response: Pavlov showed that a neutral stimulus paired with a natural one comes to call out the same response (classical conditioning), Watson built behaviourism on it and conditioned fear in Little Albert, and Thorndike showed learning by trial and error, governed by his laws of readiness, exercise and effect.

Core facts

- **Behaviourism / association theories** are also called **S-R theories** (stimulus-response). Learning = forming connections between stimuli and responses; only observable behaviour counts.
- **Behaviourism** studies only **observable, measurable behaviour**; mind, mood and thought are left out as too subjective. Learning happens through the learner's **interaction with the environment** (APPSC 2025). **Conditioning** = a **systematic procedure through which new responses to stimuli are learnt** (APPSC 2019).
- **S-O-R**: when the organism's own state (O) is placed between stimulus and response, because the same stimulus can draw different responses from different learners, the formula becomes **S-O-R** (R.S. Woodworth).
- **Ivan Petrovich Pavlov** (1849–1936), **Russian physiologist; Nobel Prize 1904** for work on the **physiology of digestion** (not for conditioning). Book: ***Conditioned Reflexes*** (English 1927).
- Pavlov found conditioning **by chance** while studying salivation as part of digestion; he first called the dog's salivation before the food reached its mouth "**psychic reflexes**".
- **Classical conditioning** is also called **Pavlovian, respondent, Type S** (Skinner's term), **conditioned reflex** or **stimulus-substitution** learning (the CS becomes a **substitute** for the UCS and calls out a similar response). It works on **involuntary** responses (**reflexes and emotions**); operant conditioning works on **voluntary** behaviour. **Respondent conditioning** (APPSC 2019) = Pavlov's discovery; the word "respondent" is Skinner's.
- **Pavlov's experiment (dog)**:
 - **Unconditioned stimulus (UCS)**: **food** (meat powder);
 - **Unconditioned response (UCR)**: **salivation** to food (natural reflex);
 - **Neutral stimulus** → **Conditioned stimulus (CS)**: **bell** (a metronome or buzzer in some trials);
 - **Conditioned response (CR)**: **salivation to the bell alone**.
 - Bell rung just before food, many times → bell alone brings saliva. Saliva was collected through a small tube (fistula) in the cheek and measured in drops.
- **Key terms of classical conditioning**:
 - **Acquisition**: the stage in which the CS-UCS link is being formed;
 - **Extinction**: CS given again and again **without the UCS** → the CR weakens and disappears;
 - **Spontaneous recovery**: after a rest, an **extinguished CR reappears** (weaker) when the CS is given again;

- **Stimulus generalisation:** stimuli **similar** to the CS (a bell of another tone) also call out the CR;
- **Stimulus discrimination:** the animal learns to respond **only to the CS** and not to similar stimuli;
- **Higher-order (second-order) conditioning:** a well-learned CS is used like a UCS to condition a new neutral stimulus (light → bell → saliva).
- **Variables: independent variable** = the **number of pairings** of CS and UCS (also their timing and strength); **dependent variable** = the **strength or amount of the CR** (drops of saliva).
- **Best timing: forward (delayed) conditioning:** CS starts **just before** the UCS (about half a second). **Backward** conditioning (UCS first) works least.
- **John Broadus Watson** (1878–1958), American, professor at **Johns Hopkins University** (Baltimore), **father of behaviourism**; paper "Psychology as the Behaviorist Views It" (**1913**, the behaviourist manifesto); book ***Behaviorism*** (1924). Psychology = the science of **behaviour**, not of consciousness; rejected **introspection**; strong **environmentalist** ("give me a dozen healthy infants...").
- **Little Albert experiment (Watson and Rosalie Rayner, 1920):** an 11-month-old boy, unafraid of a **white rat**, heard a **loud noise** (steel bar struck with a hammer) each time he touched it → he came to **fear the rat** and then other furry things (rabbit, dog, fur coat, cotton wool, a Santa Claus mask). It showed **classical conditioning of emotions in humans** and **generalisation**.
- **Mary Cover Jones (1924)** removed a boy's ("**Peter**") fear of a rabbit by pairing the rabbit with food and bringing it closer step by step (**counter-conditioning**); she is called the "mother of behaviour therapy".
- **Edward Lee Thorndike** (1874–1949), American, worked almost all his life at **Teachers College, Columbia University** (New York); **APA president 1912**; the **first connectionist** and **father of educational psychology** (book ****Educational Psychology**, 1903; **3 volumes 1913–14**). **Doctoral study** *Animal Intelligence* (1898**; book 1911).
- **Thorndike's theory** has several names: **trial and error learning, connectionism, S-R bond theory, bond psychology, learning by selecting and connecting**.
- **Thorndike's experiment:** a hungry **cat** shut in a **puzzle box** (problem box) with **fish** outside; pulling a loop or pressing a lever opened the door. The cat made many **random movements**, opened the door **by chance**, and over trials the **time taken and useless movements fell gradually** until it escaped at once.
- Thorndike also tested **chicks, fish and monkeys**. The essence of trial and error: **as trials increase, errors decrease**; the strength of an S-R bond is **inversely related to reaction time** (a strong bond = a quick response).
- **Primary (major) laws: 3**
 - **Law of readiness:** when a person is **ready** to act, acting is satisfying and being stopped is annoying; when not ready, being forced is annoying (**motivation** comes first).
 - **Law of exercise** (use and disuse): connections are **strengthened by practice (use)** and **weakened by lack of practice (disuse)**; also called the law of **frequency** ("**repetition is the base of learning**", APPSC 2019).
 - **Law of effect:** a response followed by **satisfaction** is strengthened; one followed by **annoyance** is weakened (the most important law; the root of **reinforcement**).

- **Subordinate (secondary) laws: 5**
 - **Multiple response** (varied reaction): the learner tries many responses until one works;
 - **Set or attitude** (mental set): the learner's disposition decides what is learnt;
 - **Prepotency of elements** (partial activity): the learner responds to the **most important element** of a situation and ignores the rest;
 - **Response by analogy** (assimilation): a **new situation** is met with a response used for a **similar old one**;
 - **Associative shifting**: a response is **shifted from its original stimulus to a new one** that has been present along with it; this is the law that corresponds to **Pavlov's classical conditioning**.
- **Revisions (from about 1930; Human Learning, 1931, and The Fundamentals of Learning, 1932):** the **law of exercise** was weakened (practice without knowing results does not help) and only the **satisfying half of the law of effect** was kept (punishment does not simply undo a bond; the **truncated law of effect**). Later laws: **belongingness** and **spread of effect**.

Explained

1. The stages of Pavlov's experiment

Stage	Stimulus	Response
Before conditioning	food (UCS)	salivation (UCR)
Before conditioning	bell (neutral)	no salivation (only ears prick up)
During conditioning	bell + food, many times	salivation
After conditioning	bell alone (CS)	salivation (CR)

2. Extinction, recovery, generalisation, discrimination: telling them apart

Term	What happens	Classroom example
Extinction	CS alone, repeatedly → CR fades	a teacher's threat never carried out stops working
Spontaneous recovery	faded CR returns after a rest	old fear of exams returns after the holidays
Generalisation	similar stimuli give the CR	fear of one strict teacher spreads to all teachers
Discrimination	only the CS gives the CR	a child tells the school bell from the temple bell
Response generalisation	a different response brings the same result	a rat held back from pressing with its right paw presses with the left paw or its nose

3. Conditions for good conditioning

- **Contiguity**: CS and UCS close in time (CS slightly first).
- **Repetition / frequency**: enough pairings.
- **Strength of the UCS**: a strong UCS conditions faster.

- **Freedom from distraction:** Pavlov used a sound-proof room; a sudden new noise stops the CR (**external inhibition**).
- **Health and readiness of the learner:** Pavlov's dog had to be hungry.

4. Experimental neurosis. Pavlov taught a dog to salivate to a **circle** but not to an **ellipse**, then made the ellipse more and more circle-like. When the dog could no longer tell them apart, it became restless, barked and bit: conflict in discrimination produced a "neurosis". Lesson for teachers: impossible discriminations and confusing signals cause stress.

5. Classical conditioning in school

- **Attitudes and emotions** are conditioned: a warm, encouraging teacher makes the subject itself pleasant; ridicule and punishment can make the school, the subject or the teacher a CS for fear (**school phobia**).
- **Habits** (punctuality with the bell, lining up, greeting) are formed by repeated pairing.
- **Bad habits and fears** can be removed by **extinction** and **counter-conditioning** (pair the feared thing with something pleasant, step by step).
- Audio-visual aids, rhymes and pictures build **associations** in language learning at the primary stage.
- Teachers should be consistent: inconsistent signals lead to confusion (experimental neurosis).
- **Behaviour therapy** rests on classical conditioning: **systematic desensitisation** for **phobias** (the feared thing paired with relaxation, step by step; Joseph **Wolpe**, 1958), **aversion therapy** for **alcoholism** (alcohol paired with a nausea-causing drug) and the **bell-and-pad** method for bed-wetting (**enuresis**).

6. Watson's behaviourism: the main points

- Psychology is a **natural science of behaviour**; consciousness and introspection are not scientific.
- All behaviour is made of **S-R** links and **conditioned reflexes**.
- **Environment** matters far more than heredity (only a few reflexes and emotions, fear, rage and love, are inborn).
- Learning follows the laws of **frequency and recency**.
- Watson also held that language develops by conditioning; Skinner later said imitation and reinforcement (see language development).

7. Little Albert in conditioning terms

Term	In the Little Albert study
UCS	loud noise of the hammer on the steel bar
UCR	fear and crying at the noise
CS	white rat
CR	fear of the rat
Generalisation	fear of a rabbit, dog, fur coat, cotton wool, Santa Claus mask

The study is now cited as **unethical**: Albert's fear was never removed.

8. Thorndike's trial and error: the steps

1. **Drive / motive** (hunger).
2. **Goal** (food outside).
3. **Block** (closed door).
4. **Random movements** (many tries).
5. **Chance success** (the loop is pulled).
6. **Selection and fixation** of the successful response; **elimination of errors** over trials.

The learning curve fell **gradually**, not suddenly: Thorndike took this as proof that learning is the slow **stamping in** of an S-R bond, not insight (compare Köhler's sudden insight in chimpanzees).

9. Thorndike's laws in the classroom

Law	Teacher's action
Readiness	motivate first; teach when the child is mentally and physically ready
Exercise	drill, practice, revision; use what is learnt
Effect	praise, rewards, success experiences; avoid humiliating punishment
Multiple response	let pupils try different ways
Set or attitude	create a positive attitude to the subject
Prepotency of elements	highlight the key point of a lesson
Response by analogy	link new lessons to old ones
Associative shifting	move from concrete aids to words and symbols

Thorndike's own classroom advice: **praise** the wanted behaviour at once, and use **planned ignoring** to weaken unwanted behaviour (no satisfier, so the bond weakens).

10. Classical conditioning vs trial and error

Point	Pavlov (classical)	Thorndike (trial and error)
Animal and apparatus	dog, bell, food	cat, puzzle box, fish
Learner's role	passive; the response is called out	active; tries responses
Response	involuntary reflex (salivation)	voluntary act (pulling a loop)
Key law	contiguity and repetition	effect (satisfaction)

Classical conditioning **pairs stimuli**; Thorndike's (and later Skinner's operant) learning depends on the **consequences** of the response.

11. Other Thorndike facts asked in exams

- **Transfer by identical elements** (with Woodworth, 1901; see EDU-LR-01).
- **Three kinds of intelligence: abstract, mechanical and social.**
- Pioneer of **educational measurement**: "whatever exists at all exists in some amount" (paraphrased: anything that exists can be measured).

- ***The Teacher's Word Book*** (1921), a list of the most frequent English words.

12. Who's who of the S-R theories

Theorist	Base	Experiment	Book to remember
Pavlov	Russia (St Petersburg)	dog, bell, saliva	Conditioned Reflexes (English 1927)
Watson	Johns Hopkins	Little Albert (1920)	Behaviorism (1924)
Thorndike	Teachers College, Columbia	cat, puzzle box	Animal Intelligence (1898; book 1911)
Skinner	Harvard	rat and pigeon, Skinner box	The Behavior of Organisms (1938)
Hull	Yale	rats; drive reduction	Principles of Behavior (1943)
Guthrie	University of Washington	cats in a puzzle box (one-trial learning)	The Psychology of Learning (1935)

- **Köhler, Koffka, Wertheimer** (Gestalt) and **Tolman** are **not** S-R theorists.
- **Neal Miller and John Dollard** (*Social Learning and Imitation*, **1941**) explained **imitation itself as a learnt response** that lasts when it is reinforced: a behaviourist view before Bandura.

Common traps

✗ "Pavlov won the Nobel Prize for classical conditioning." ✓ It was for the **physiology of digestion** (1904).

✗ "In Pavlov's experiment the bell is the unconditioned stimulus." ✓ **Food = UCS, bell = CS**, saliva to food = UCR, saliva to bell = CR.

✗ "Extinction = the CR returns after rest." ✓ That is **spontaneous recovery**; extinction = CR fades when the CS comes **without the UCS**.

✗ "Generalisation and discrimination are the same." ✓ Generalisation = respond to **similar** stimuli; discrimination = respond **only to the CS**.

✗ "The independent variable in classical conditioning is the strength of the CR." ✓ Strength of the CR is the **dependent** variable; the **number of pairings** is the independent variable.

✗ "Little Albert showed operant conditioning." ✓ It showed **classical conditioning of fear in humans** (Watson and Rayner, 1920).

✗ "Watson is the father of educational psychology." ✓ Watson = **father of behaviourism**; **Thorndike** = father of educational psychology; Wundt = father of experimental psychology.

✗ "Thorndike's experiment used a rat in a box." ✓ A **cat** in a **puzzle box**; the rat (or pigeon) in a box is **Skinner**.

✗ "Thorndike gave four primary laws." ✓ **Three** primary laws (readiness, exercise, effect) and **five** subordinate laws.

✗ "Prepotency of elements is the subordinate law linked to Pavlov." ✓ Standard texts link **associative shifting** to classical conditioning. (The APPSC HWO 2025 final key marked prepotency of elements; treat that key as doubtful.)

✗ "Classical conditioning involves voluntary behaviour." ✓ It involves **involuntary (reflex)** behaviour and **pairs stimuli**; operant learning uses **consequences**.

✗ "Spontaneous recovery = the CR comes back when the CS and UCS are paired again." ✓ That is **re-acquisition** (faster than the first learning); spontaneous recovery comes back after **rest, without fresh pairing**. (The BRAOU Learning, Teaching and Assessment book describes it the first way; follow the standard meaning.)

✗ "Little Albert: 1921." ✓ Watson and Rayner published it in **1920**; Albert was about **9 months** old at the first tests and **11 months** when conditioning began.

✗ "'Repetition is the base of learning' is the law of effect." ✓ It is the **law of exercise** (use and disuse).

✗ "Watson worked at Columbia (or Yale)." ✓ Watson: **Johns Hopkins**; Thorndike: **Teachers College, Columbia**; Hull: **Yale**; Skinner: **Harvard**.

✗ "Köhler is an S-R (associationist) theorist." ✓ Köhler is a **Gestalt** psychologist; the S-R group is Pavlov, Watson, Thorndike, Skinner, Guthrie, Hull.

✗ "Stimulus generalisation = a different response that brings the same result." ✓ That is **response generalisation**; stimulus generalisation = the **same response to similar stimuli**.

Quick revision

- S-R / association theories: Pavlov, Watson, Thorndike, (Skinner, Hull).
- Pavlov: Russian physiologist; Nobel 1904 (digestion); dog, bell, food, saliva; "psychic reflexes"; involuntary responses.
- UCS food, UCR saliva, CS bell, CR saliva to bell.
- Extinction: CS without UCS; spontaneous recovery after rest; generalisation vs discrimination.
- Independent variable: number of CS-UCS pairings; dependent: strength of CR.
- Watson (Johns Hopkins): father of behaviourism, 1913 manifesto; Little Albert 1920 with Rayner (white rat + loud noise).

- Thorndike (Teachers College, Columbia): father of educational psychology; Animal Intelligence 1898; cat in puzzle box; errors fall as trials rise.
- Trial and error = connectionism = S-R bond theory.
- Primary laws: readiness, exercise (repetition; use and disuse), effect (most important).
- Subordinate: multiple response, set, prepotency, analogy, associative shifting ($\approx$ Pavlov).

3 Operant conditioning, Hull and programmed learning

B.F. Skinner's operant conditioning says behaviour is shaped by its consequences (reinforcement makes it more likely, punishment less likely); Clark Hull explained learning as drive reduction building habit strength; and Skinner's ideas became programmed instruction (linear), later answered by Crowder's branching programme.

Core facts

- **Operant conditioning: B.F. Skinner** (Burrhus Frederic Skinner, 1904–1990, Harvard), American **behaviourist**. Also called **instrumental conditioning** and **Type R** (response) conditioning; Pavlov's classical conditioning is **Type S** (stimulus). Skinner **coined "operant conditioning" in 1938** (*The Behavior of Organisms*). He was a **radical behaviourist**: the mind exists, but only observable behaviour and its consequences should be studied. His short rule: **rewarded behaviour is repeated**.
- **Operant** = a response that **operates on the environment** and is **emitted** freely by the organism; a **respondent** (Pavlov) is **elicited** by a known stimulus. It is called **instrumental** because the learner's response is the **instrument** that brings the reinforcer (APPSC 2019: instrumental conditioning = operant conditioning).
- **Reinforcement** = any consequence that **strengthens** (makes more likely) the response it follows. **Positive reinforcement** = presenting a rewarding stimulus after a response (APPSC 2019); studies find it the most powerful kind. **Punishment** = a consequence that **weakens** the response.
- **Skinner box** (operant conditioning chamber): a **hungry rat presses a lever** and gets a food pellet; later **pigeons peck a key**.
- **Key principle**: behaviour followed by a **reinforcer** is **strengthened** (repeated); behaviour followed by **no reinforcer** weakens (**extinction**).
- **Shaping**: reinforcing **successive approximations** to the target behaviour (the "Successive" item in APPSC 2025's match was Skinner).
- **Skinner's books**: **The Behavior of Organisms (1938)**, operant conditioning set out; **Walden Two (1948)**, a novel about a society run on reinforcement; **Science and Human Behavior (1953)**, asked in APPSC 2025; **Verbal Behavior (1957)**, language learnt by imitation and reinforcement; **Schedules of Reinforcement (1957)**, with C.B. Ferster; **The Technology of Teaching (1968)**, teaching machines and programmed learning; **Beyond Freedom and Dignity (1971)**; **About Behaviorism (1974)**.
- **Language (Skinner)**: children learn language through **imitation and reinforcement** (APPSC 2025). **Chomsky** (1959 review of Verbal Behavior) disagreed: language is **innate** (LAD).
- **Clark L. Hull** (1884–1952, Yale, Institute of Human Relations; method **hypothetico-deductive**, also called **mathematico-deductive**): **drive-reduction theory**, also called **need-reduction**, **systematic behaviour** or **hypothetico-deductive** theory. Book **Principles of Behavior (1943)**; also **Essentials of Behavior (1951)**, **A Behavior System (1952)**.
- **Hull's concepts**: **drive** (D), **habit strength** (sHr), **reinforcement** (= drive reduction), **reaction potential** (sEr = sHr × D), **reactive inhibition**, **goal gradient**. **Cognitive schemas are NOT**

Hull's (they belong to Piaget and the cognitive school; APPSC 2025).

- **Programmed instruction:** father **B.F. Skinner** (article "The Science of Learning and the Art of Teaching", **1954**); it grew from **operant conditioning** and Thorndike's **law of effect**, and Skinner called it the first use of laboratory findings on practical problems of education. Each small step of a programme is a **frame**. **Sidney L. Pressey** built the first self-testing **teaching machine** in the **1920s**.
- **Linear programming** (Skinner): one fixed path, small steps, learner writes the answer, immediate confirmation; it stresses the **correct answer** (APPSC 2022).
- **Branching programming:** **Norman A. Crowder** (about 1960), called **intrinsic programming**; multiple-choice answers; a wrong answer sends the learner to a **remedial frame**. Principles: **exposition, diagnosis, remediation**; in book form a **scrambled textbook**.
- **Mathetics:** **Thomas F. Gilbert** (1962; Greek *mathein*, to learn), teaches by **backward chaining** (last step first); principles: **chaining, discrimination, generalisation**.

Explained

1. The four consequences. "Positive" means something is **added**, "negative" means something is **taken away**. Reinforcement always **increases** a behaviour; punishment always **decreases** it.

	Add a stimulus	Remove a stimulus	Effect
Reinforcement	Positive: praise, marks, sweets	Negative: stop a nagging noise, cancel homework	Behaviour increases
Punishment	Positive: scolding, extra work	Negative: take away play time, a fine (response cost)	Behaviour decreases

- **Negative reinforcement is not punishment.** A pupil finishes work to **escape** the teacher's reminders; the work rate goes up.
- **Primary reinforcers** satisfy biological needs (food, water). **Secondary (conditioned) reinforcers** gain value by pairing (praise, grades, stars). **Generalised reinforcers** buy many things (money, tokens); a **token economy** in a hostel or class uses them.
- **Premack principle** (David Premack, "Grandma's rule"): a preferred activity reinforces a less preferred one: "finish the sums, then play".
- Skinner preferred **reinforcement to punishment**: punishment only suppresses behaviour for a while, causes fear and does not teach the right response.
- **Problems of punishment:** the behaviour is **suppressed, not unlearned**; it breeds **fear and aggression** (even fear of school); it shows what **not** to do, not what to do. If used at all, it works best when **immediate, consistent, moderate** from the start, and paired with a **rewarded alternative**.

2. Schedules of reinforcement.

- **Continuous reinforcement (CRF):** every correct response is rewarded. Fastest for learning a **new** behaviour, but extinction is also fast.
- **Partial (intermittent) reinforcement:** only some responses are rewarded. Learning is slower but **more resistant to extinction** (partial reinforcement effect).

Schedule	Reward given	Response pattern	Example
Fixed ratio (FR)	After a set number of responses	High rate, short pause after reward	Piece-rate wages, a star for every 5 sums
Variable ratio (VR)	After an unpredictable number	Highest, steady rate; hardest to extinguish	Lottery, slot machine, fishing
Fixed interval (FI)	First response after a set time	Scallop : slow after reward, fast near the time	Monthly salary, studying just before scheduled tests
Variable interval (VI)	First response after varying times	Moderate, steady rate	Surprise tests, checking messages

3. Other operant processes.

- **Shaping**: reward closer and closer approximations (teaching a child to write a letter, a pigeon to turn a circle).
- **Chaining**: linking simple responses into a sequence, each step reinforcing the one before.
- **Extinction**: withholding the reinforcer weakens the response; **spontaneous recovery** may follow after rest.
- **Discriminative stimulus (SD, "S-dee")**: a cue showing when a response will be reinforced (the bell for answering, a green light).
- **Generalisation and discrimination**: responding to similar cues, and learning to respond only to the right one.
- **Superstitious behaviour**: an accidental link between a response and a reward (Skinner's pigeons, 1948).

4. Classical vs operant conditioning (APPSC 2025 asked the main difference).

Point	Classical (Pavlov)	Operant (Skinner)
Core idea	Pairs two stimuli (CS + US)	Consequence after a response shapes it
Behaviour	Involuntary, reflex; elicited	Voluntary; emitted
Order	Stimulus comes before response ($S \rightarrow R$)	Response comes before reward ($R \rightarrow S$)
Learner	Passive	Active
Type	Type S, respondent	Type R, instrumental
Animal, apparatus	Dog, salivation	Rat or pigeon, Skinner box

5. Operant conditioning in the classroom.

- Reward right answers **immediately**; praise effort, not only results.
- Break skills into **small steps** and reinforce each (shaping).
- Use **intermittent** praise once a habit is formed so that it lasts.
- Ignore minor attention-seeking (extinction) instead of scolding it.

- **Behaviour modification** for discipline in classes and hostels: clear rules, token rewards, time-out. It changes behaviour by planned **reinforcement and extinction**, so it rests mainly on **operant** conditioning.
- **Token economy**: tokens (stars, points) earned for target behaviour are later exchanged for rewards; used with children with **intellectual disability**, in **de-addiction** and in **rehabilitation** centres.
- Children with intellectual disability learn **self-care** (dressing, eating, toilet use) in small steps, each reinforced.
- **Applied behaviour analysis (ABA)** grew out of classical conditioning, operant conditioning and social learning theory.
- Programmed learning, teaching machines and **computer-assisted instruction (CAI)** grew from it.

6. Hull's drive-reduction theory.

- Chain: **need** (lack of food) → **drive** (hunger, an inner push) → **response** → goal reached → **drive is reduced** → that S-R bond is reinforced.
- **Primary drives** are inborn (hunger, thirst, pain avoidance); **secondary drives** are learnt (fear, desire for money or approval).
- **Habit strength (sHr)** grows with the **number of reinforced trials**. Behaviour happens when **reaction potential** $sEr = sHr \times D$ is high enough: a strong habit needs a drive to show itself.
- **Reactive inhibition**: fatigue from repeating a response, which rest removes; supports **spaced (distributed) practice**.
- **Goal gradient**: responses near the goal are learnt faster (a rat runs faster as it nears the food).
- Hull is a **neo-behaviourist**: he used **intervening variables** (drive, habit) between S and R and stated his theory as **postulates** with mathematical equations.
- **Classroom use**: link lessons to pupils' needs; reward soon after the response; give practice with rest pauses; build habits through repetition.

7. Programmed instruction (PI). Self-instructional material in which content is broken into small **frames**; the learner responds to each and is told at once whether the response was right.

Basic principles: **small steps, active responding, immediate feedback** (knowledge of results acts as reinforcement), **self-pacing, logical sequence, student testing** (the programme is revised until learners succeed).

Point	Linear (Skinner)	Branching (Crowder)
Path	Same straight path for all	Path depends on the learner's answer
Frame size	Very small steps	Larger frames, more content
Response	Constructed (learner writes it)	Multiple-choice (learner selects)
Errors	Avoided (target under about 5%)	Used to diagnose; wrong answer → remedial frame
Basis	Operant conditioning, reinforcement	Recognition and correction of mistakes
Also called	Extrinsic programming	Intrinsic programming; "scrambled textbook"

Kinds of frames: introductory (teaching) frames, practice frames, review frames and test (criterion) frames. **Prompts** are cues given in a frame and slowly removed (**fading**). **RULEG** (rule, then example: a **deductive** order) and **EGRUL** (example, then rule: an **inductive** order) are ways of ordering a frame sequence (Evans, Homme and Glaser, 1962).

Steps in preparing a programme: (1) choose the unit, (2) write the objectives in behavioural terms, (3) analyse the content, (4) find the learners' **entry behaviour**, (5) write the frames, (6) try out (individual, small group, field try-out), (7) revise and **validate** against error rate and gains.

Merits: self-paced, individualised, immediate feedback (knowledge of results keeps the learner **motivated**), the learner is active, useful in distance and remedial teaching; a failed programme is **revised**, the learner is not blamed. **Limits:** dull for bright pupils (linear), costly to prepare, little room for discussion, suits factual content more than creativity or values.

Common traps

X "Negative reinforcement means punishment." ✓ Negative reinforcement **removes** something unpleasant and **increases** the behaviour; punishment **decreases** it.

X "Operant behaviour is elicited by a stimulus." ✓ It is **emitted**; classical (respondent) behaviour is elicited.

X "Classical conditioning uses rewards and operant uses punishment." ✓ Classical **pairs stimuli**; operant uses **consequences** (reward or punishment) after a response.

X "Science and Human Behavior is by William James (or Pavlov)." ✓ **B.F. Skinner, 1953.**

X "Skinner box: dogs." ✓ **Rats and pigeons**; dogs are Pavlov's.

X "Fixed ratio gives the highest, most lasting response." ✓ **Variable ratio** does.

X "Continuous reinforcement makes learning last longest." ✓ It is quickest to **learn** but quickest to **extinguish**; partial reinforcement lasts longer.

X "Cognitive schemas are Hull's concept." ✓ Hull: **drive, habit strength, reinforcement**; schemas: **Piaget**.

X "Branching programming was developed by Skinner." ✓ **Norman Crowder**; Skinner = **linear**.

X "Linear programmes use multiple-choice answers." ✓ Linear uses **constructed** responses; **branching** uses multiple choice.

X "Pressey's teaching machine came after Skinner's." ✓ **Pressey (1920s)** came first; Skinner's followed in 1954.

✗ "Fixed ratio and fixed interval are continuous schedules." ✓ FR, VR, FI and VI are all **partial (intermittent)**; continuous = **every** response reinforced. (The BRAOU Cognitive and Behavioral Processes book calls FR and FI "continuous"; follow the standard.)

✗ "Fixed interval is the easiest schedule to extinguish." ✓ **Continuous** reinforcement is extinguished most easily; variable ratio resists most. (The same BRAOU book says fixed interval.)

✗ "Negative reinforcement, like punishment, is used to stop unwanted behaviour." ✓ Negative reinforcement always **strengthens** behaviour; only punishment weakens it. (BRAOU wording and examples mix the two.)

✗ "Skinner was a cognitivist." ✓ A **radical behaviourist** (a BRAOU heading "Skinner-Cognitivism" is a slip).

✗ "Principles of Behavior is Skinner's book." ✓ It is **Hull's** (1943); Skinner's 1938 book is **The Behavior of Organisms**.

✗ "Behaviour modification rests on classical conditioning." ✓ Mainly on **operant** conditioning (reinforcement, extinction, tokens); desensitisation of phobias is the classical-conditioning therapy.

Quick revision

- Skinner (radical behaviourist): operant = instrumental = Type R (term 1938); behaviour emitted and shaped by consequences.
- Skinner box: rat presses lever, pigeon pecks key.
- Positive = add, negative = remove; reinforcement increases, punishment decreases (suppresses, does not teach).
- Schedules: FR, VR (highest, most lasting), FI (scallop), VI; partial outlasts continuous.
- Shaping = reinforcing successive approximations.
- Books: Behavior of Organisms 1938, Walden Two 1948, Science and Human Behavior 1953, Verbal Behavior 1957, Technology of Teaching 1968.
- Skinner on language: imitation and reinforcement; Chomsky disagreed.
- Hull (Yale): drive reduction, habit strength, $sEr = sHr \times D$; Principles of Behavior 1943.
- Linear PI: Skinner, small steps, constructed answer, correct-answer focus.
- Branching PI: Crowder, intrinsic, multiple choice, remedial frames (exposition, diagnosis, remediation); Pressey: first teaching machine.

4 Cognitive and constructivist theories: Gestalt, Tolman, Gagne, Bruner

Cognitive theories say learning happens inside the mind, by seeing relations (Gestalt insight), building cognitive maps (Tolman), climbing a hierarchy of learning types (Gagne) and discovering structure (Bruner); constructivism adds that each learner builds knowledge from experience, and metacognition lets the learner plan and check that learning.

Core facts

- **Three families** of learning theory (BRAOU): **behaviourist**, **cognitive–information–processing** and **cognitive–constructivist**.
- **Cognitivism** studies **internal mental processes**: perception, thinking, memory, problem solving (APPSC 2025). **Constructivism** stresses learning that is built on, and **relevant to, the learner's own experience** (APPSC 2025).
- **Gestalt** is a **German** word meaning **form, shape, pattern or configuration** (APPSC 2022: "configuration"). Idea: **the whole is more than the sum of its parts**.
- **Gestalt founders: Max Wertheimer** (founder; phi phenomenon, **1912**), **Wolfgang Köhler** and **Kurt Koffka**. Kurt Lewin (field theory) is linked with them.
- **Insight learning: Wolfgang Köhler**, experiments on **chimpanzees** at the anthropoid station on **Tenerife** (Canary Islands), **1913–1920**; book **The Mentality of Apes** (German 1917, English 1925). The bright chimp **Sultan joined two sticks** to rake in a banana; others **stacked boxes** to reach fruit hung from the roof.
- **Insight** = **sudden** grasp of the relations in a problem (the "aha" moment), after which the solution is retained and transferred; Archimedes' "**Eureka**" is the classic example. Köhler argued against Thorndike that animals solve problems by seeing relations in the **whole field**, not by blind trial and error.
- **Other Gestalt books**: Koffka, **The Growth of the Mind** (1924) and **Principles of Gestalt Psychology** (1935); Köhler, **Gestalt Psychology** (1929); Wertheimer, **Productive Thinking** (1945).
- **Gestalt laws of perception: Prägnanz** (good form, the master law), **proximity, similarity, closure, continuity, figure-ground, common fate**.
- **Edward C. Tolman** (1886–1959, **Berkeley**): **purposive behaviourism**, also **sign learning** or **sign-Gestalt** theory; book **Purposive Behavior in Animals and Men** (**1932**); **latent learning** (Tolman and Honzik, **1930**, rats in a maze); **cognitive map** (paper "Cognitive Maps in Rats and Men", **1948**); **place learning**. Tolman is classed as a **cognitive behaviourist**.
- **Robert M. Gagne** (1916–2002): **The Conditions of Learning** (**1965**); **hierarchical learning** (APPSC 2022), eight types from simple to complex.
- **Gagne's eight types, in order**: (1) **signal** learning, (2) **stimulus–response (S–R)** learning, (3) **chaining**, (4) **verbal association**, (5) **multiple discrimination**, (6) **concept** learning, (7) **principle (rule)** learning, (8) **problem solving**. (APPSC 2025 answer: signal → S–R → chain → concept → rule.)

- **Jerome S. Bruner** (1915–2016, Harvard): **discovery learning**; **three modes of representation**: **enactive** (action), **iconic** (images), **symbolic** (language and symbols); **spiral curriculum**. **Three principles of instruction**: **readiness**, **spiral organisation**, **going beyond the information given**.
- **Bruner's books**: **A Study of Thinking** (1956, with Goodnow and Austin), **The Process of Education** (1960), **Toward a Theory of Instruction** (1966), **The Culture of Education** (1996).
- **Constructivism**: **Piaget** (cognitive or individual constructivism) and **Vygotsky** (social constructivism); **John Dewey** (learning by experience) is its forerunner. India's **NCF 2005** adopted a constructivist approach. **Cognitive constructivists**: **Piaget and Bruner**; **social constructivist**: **Vygotsky**; **Dewey** is the philosophical founder.
- **Piaget's three processes**: **assimilation** (fitting a new experience into an existing scheme), **accommodation** (changing the scheme to fit), **equilibration** (the master process that balances the two).
- **Lev Vygotsky** (1896–1934, Russian; died at **37**): **social constructivism**; learning cannot be separated from its social setting. **Zone of proximal development (ZPD)** = the gap between the **actual** level (what the learner does **alone**) and the **potential** level (what he does **with help** of an adult or abler peer). Books: *Thought and Language* (English **1962**), *Mind in Society* (**1978**).
- **David P. Ausubel**: **meaningful verbal (reception) learning** (APPSC 2019), **advance organisers**; "the most important single factor influencing learning is **what the learner already knows**". **Progressive differentiation** = general ideas first, then details; **integrative reconciliation** = **merging new ideas with the existing cognitive structure** (APPSC 2019).
- **Metacognition**: "thinking about one's own thinking"; term by **John H. Flavell** (**1976**).
- **Self-regulated learning**: the learner **plans, monitors and adjusts** strategies from awareness of his own thinking (APPSC 2025); best-known model **Barry Zimmerman**: forethought → performance → self-reflection.
- **Thinking** = the mental manipulation of information stored as **concepts, images or propositions** (APPSC 2019).
- **Heuristic** = a mental **shortcut**; **availability heuristic** (Amos **Tversky** and Daniel **Kahneman**, **1973**) = judging how likely something is by **how easily examples come to mind** (APPSC 2025 key).

Explained

1. Behavioural vs cognitive vs constructivist views.

Point	Behaviourism	Cognitivism	Constructivism
Learning is	Change in observable behaviour (S–R)	Change in mental structures	Building one's own meaning
Learner	Passive, reacts	Processes information	Active builder
Teacher	Gives stimuli and rewards	Organises information	Facilitator, guide

Point	Behaviourism	Cognitivism	Constructivism
Names	Pavlov, Thorndike, Skinner, Hull	Gestalt, Tolman, Bruner, Ausubel	Piaget, Vygotsky, Dewey, Bruner

- **Information-processing theory** (part of cognitivism) compares the mind to a computer: **input** → **encoding** → **storage** → **retrieval**.
- **View of motivation:** behaviourists stress **extrinsic** (reinforcement), cognitivists **intrinsic**, social constructivists **both**.

2. Gestalt insight learning.

- Köhler kept the food out of reach so the chimp had to see a relation between tools and goal. After failed attempts and a pause, **Sultan** suddenly fitted one stick into another and pulled the banana in.
- **Features of insight:** it is **cognitive** and **sudden**; it needs **no repetition**; it involves **structuring and restructuring** of the perceptual field; it depends on **perceiving the whole situation**; once found, the solution is **repeated at once** without errors, is **retained** and **transfers** to similar problems.
- **Conditions that help insight:** the learner's **intelligence and maturity**, **past experience**, how the problem is **arranged** (all parts in view), and **trial in thought** rather than blind trial and error.
- Insight suits **complex problems** and uses thinking, reasoning and intelligence.
- **Contrast with Thorndike:** Thorndike's cats learned **gradually by trial and error**; Köhler's apes learned **suddenly by insight**. Gestaltists said Thorndike's puzzle box hid the relations from the animal.
- **Classroom use:** teach **whole to part** (whole method), show relations and patterns, use problem solving and discovery, arrange material so learners can see the whole structure.

3. Gestalt laws of organisation.

Law	We perceive...	Example
Proximity	Things close together as a group	Dots in pairs read as pairs
Similarity	Similar things as a group	Rows of same-coloured dots
Closure	Incomplete figures as complete	A broken circle seen as a circle
Continuity	Smooth lines rather than sudden changes	Two crossing curves
Figure-ground	An object standing out from a background	Vase or two faces
Prägnanz	The simplest, most stable form	Overlapping shapes seen as simple ones

4. Tolman: learning without reward showing at once.

- **Latent learning experiment (Tolman and Honzik, 1930):** three groups of rats ran a maze. Group 1 was **always fed** at the goal; group 2 was **never fed**; group 3 was **not fed for the first 10 days, then fed from day 11**. Group 3's errors fell sharply at once, to the level of group 1, so it had **learnt the maze earlier without reward**. (**Blodgett, 1929**, in Tolman's laboratory, ran the first such study; Tolman and Honzik is the best-known.)
- **Latent learning** = learning that stays hidden until there is a reason (an incentive) to show it. It challenged Hull's view that reinforcement is needed for learning.

- **Cognitive map:** an inner mental picture of the environment; rats learnt **places**, not only fixed turns (**place learning**): started from a new point in a familiar maze, they still went straight to the food box. Everyday latent learning: a person who walks past a shop daily can at once direct a stranger to it.
- **Purposive behaviourism:** behaviour is **goal-directed** and **molar** (whole acts), not a chain of tiny muscle movements. Learners form **expectancies** (signs that lead to goals). Tolman is a **bridge between behaviourism and cognitivism**.
- **Match from APPSC 2025:** reflexes → **Pavlov**; successive (approximation) → **Skinner**; habit strength → **Hull**; latent learning → **Tolman**.

5. Gagne's hierarchy explained. Each type needs the one below it as a **prerequisite**, so teaching should move from simple to complex.

Type	What is learnt	Example
1 Signal	Involuntary response to a signal (Pavlov)	Fear at a loud bang
2 Stimulus-response	Voluntary response to a stimulus (Skinner, Thorndike)	Child says "mama" and is praised
3 Chaining	Linking motor S-R units	Tying shoe laces
4 Verbal association	Linking verbal units	Naming objects, reciting a poem
5 Multiple discrimination	Telling apart similar stimuli	Telling b from d, birds apart
6 Concept	Grouping by common properties	"Triangle", "mammal"
7 Principle (rule)	Linking two or more concepts	"Metals expand when heated"
8 Problem solving	Combining rules to solve new problems	Working out a new sum

Gagne later listed **five learning outcomes: intellectual skills, cognitive strategies, verbal information, motor skills and attitudes**. His **nine events of instruction**: gain attention; tell the objective; recall prior learning; present the content; guide learning; elicit performance; give feedback; assess performance; help retention and transfer. Gagne is called **eclectic**: he joins behavioural (lower types) and cognitive (higher types) learning.

6. Bruner.

- **Modes of representation: enactive** (knowing through action and handling, infancy), **iconic** (through images and pictures, early childhood), **symbolic** (through words, numbers and symbols, from about age 7). Adults use all three; teaching new ideas should move **enactive** → **iconic** → **symbolic** (objects → pictures → symbols).
- **Discovery learning:** learners find principles themselves from examples, guided by the teacher; it builds understanding, motivation and transfer. Steps: problem → gathering data → forming a hypothesis → testing → conclusion.
- **Spiral curriculum:** basic ideas are met early in a simple form and revisited at higher levels. Bruner's claim: any subject can be taught in some honest form to any child at any stage of development (The Process of Education, 1960, after the **Woods Hole conference, 1959**).

- **Theory of instruction (1966)** has four features: **predisposition** to learn, **structure** of knowledge, **sequence** of presentation, and **nature and pacing of rewards**.
- **Concept attainment** (A Study of Thinking, 1956, with Goodnow and Austin) is the base of the **concept attainment model** of teaching (Joyce and Weil; APPSC 2019).
- **Bruner and Piaget differ:** for Bruner, **language drives** cognitive growth (Piaget: language follows thought); development is **continuous** and can be **speeded up** by good teaching (so he opposed **waiting for readiness**); the three modes stay **integrated** (symbolic thought does not replace the earlier modes); adults and abler peers matter a great deal. In this he shows **Vygotsky's** influence.
- **Discovery-based models:** guided discovery, problem-based, simulation-based, case-based and incidental learning.
- **Scaffolding:** the term comes from **Wood, Bruner and Ross (1976)**; it is used for the support given within Vygotsky's **zone of proximal development**.

7. Constructivism.

- Knowledge is **not transmitted** ready-made; the learner **constructs** it by linking new experience to **prior knowledge**.
- **Piaget:** individual construction through **assimilation**, **accommodation** and **equilibration**. **Vygotsky:** knowledge is built **socially**, through language, peers and adults (ZPD, scaffolding). **Radical constructivism:** Ernst von Glasersfeld.
- **Constructivist classroom:** learner-centred; group work; real-life problems; questioning; the teacher as **facilitator**; assessment of understanding, not recall. The **5E model: Engage, Explore, Explain, Elaborate, Evaluate**.
- **Piaget's teaching principles:** discovery learning, sensitivity to the child's **readiness**, acceptance of **individual differences**; children build and test their own theories of the world.
- **Vygotsky:** every higher function appears **twice**: first **between people** (inter-psychological), then **inside the child** (intra-psychological); language and culture shape thinking; knowledge is **co-constructed**.
- Policy link: **NCF 2005** asks for learning connected to life outside school and children constructing knowledge (and also cites "Learning without Burden", 1993).

8. Metacognition and self-regulated learning.

- **Flavell's metacognition** has two parts: **metacognitive knowledge** (about oneself as a learner, the task and strategies) and **metacognitive regulation** (planning, monitoring, evaluating).
- **Self-regulated learning (SRL)** applies this: the learner sets goals, chooses strategies, watches progress, and changes the approach when it is not working. **Zimmerman's cycle: forethought** (goal setting, planning, self-efficacy) → **performance** (self-control, self-observation) → **self-reflection** (self-evaluation, adjusting). Paul Pintrich also built an SRL model.
- **Classroom use:** think-aloud, self-questioning ("Do I understand this?"), learning diaries, checklists, goal setting before a task and review after it.

9. Ausubel: meaningful reception learning

Term	Meaning	Classroom use
Reception learning	content given in final, organised form	well-planned expository teaching
Advance organiser	a short, general introduction given before the lesson	link the new lesson to what pupils know
Progressive differentiation	most general ideas first, then details	teach the big idea, then break it down
Integrative reconciliation	new ideas merged with existing ideas; differences resolved	compare and connect with earlier lessons

Ausubel held that **pure discovery** is too slow for most school learning; well-organised **expository** teaching is meaningful when it is linked to the learner's **existing cognitive structure** (rote learning = not linked). His theory is also called **subsumption** theory.

10. Thinking and heuristics

- **Units of thought:** concepts, images (mental pictures), propositions (statements linking concepts).
- **Algorithm** = a step-by-step rule that always gives the answer (slow but sure); **heuristic** = a rule of thumb (quick, may fail).
- **Availability heuristic:** people fear air travel after news of a crash because such cases come easily to mind. **Representativeness:** judging by how typical something looks. **Anchoring:** sticking to the first number heard.

11. Who gave which idea (match items)

Concept	Psychologist
Phi phenomenon (apparent movement)	Wertheimer
Insight	Köhler
Life space, field theory	Lewin
Latent learning, cognitive map	Tolman
Hierarchy of learning	Gagne
Discovery learning, spiral curriculum	Bruner
Advance organiser, meaningful verbal learning	Ausubel
Zone of proximal development	Vygotsky
Modelling, self-efficacy	Bandura

Common traps

✗ "Gestalt means individual (or learning)." ✓ It means **form, pattern, configuration**.

✗ "Insight learning: Thorndike's cats." ✓ **Köhler's chimpanzees** (Sultan); Thorndike = trial and error.

✗ "Wertheimer did the ape experiments." ✓ **Köhler** did; Wertheimer **founded** Gestalt (phi phenomenon).

✗ "Latent learning is Hull's (or Skinner's)." ✓ **Tolman** (with Honzik, 1930).

✗ "Gagne's hierarchy starts with S-R learning." ✓ It starts with **signal learning**; S-R is second, **problem solving** is last.

✗ "Concept learning comes before multiple discrimination." ✓ **Multiple discrimination (5)** comes before **concept (6)**, then **principle (7)**.

✗ "Bruner's modes: sensory, iconic, symbolic." ✓ **Enactive, iconic, symbolic**.

✗ "Spiral curriculum is Piaget's." ✓ **Bruner's** (The Process of Education, 1960).

✗ "Cognitivism and constructivism are the same answer." ✓ Inner mental processes (thinking, memory) = **cognitivism**; learning built from the learner's **own experience** = **constructivism**.

✗ "Self-regulated learning is a behaviourist framework." ✓ It is a **metacognitive** framework (planning, monitoring, adjusting).

✗ "Insight needs many repetitions; errors fall gradually." ✓ Insight is **sudden** and needs **no repetition**; a gradual fall in errors belongs to **trial and error**.

✗ "Advance organisers and meaningful verbal learning are Bruner's." ✓ They are **Ausubel's**; Bruner = **discovery** learning.

✗ "Piaget and Vygotsky are both cognitive constructivists." ✓ Piaget and Bruner = **cognitive**; **Vygotsky** = **social** constructivist.

✗ "Bruner, like Piaget, said language follows thought and teachers must wait for readiness." ✓ Bruner held that **language drives** thought and that good teaching can **speed up** development.

✗ "The ZPD is what the child can do alone." ✓ That is the **actual** level; the ZPD is the gap up to what he can do **with help**.

✗ "A heuristic is an exact step-by-step rule." ✓ That is an **algorithm**; a heuristic is a **shortcut**. (APPSC 2025's stem described heuristics in general; its key = **availability heuristic**.)

✗ "Köhler's work on Tenerife was 1924–25." ✓ The experiments ran **1913–1920**; 1917 is the German book, 1924–25 the English translation.

Quick revision

- Gestalt (German) = configuration; whole > sum of parts; Wertheimer (phi, 1912), Köhler, Koffka; laws: Prägnanz, proximity, similarity, closure, continuity, figure-ground.
- Köhler: chimps at Tenerife (1913–1920), Sultan, The Mentality of Apes; insight = sudden, no repetition, transfers.
- Tolman (Berkeley): purposive behaviourism, latent learning (1930), cognitive map (1948), place learning.
- Gagne, Conditions of Learning 1965: signal, S–R, chaining, verbal association, multiple discrimination, concept, principle, problem solving.
- Bruner: discovery learning; enactive, iconic, symbolic; spiral curriculum; Process of Education 1960.
- Ausubel: meaningful reception learning, advance organisers, progressive differentiation, integrative reconciliation.
- Constructivism: Dewey the root; Piaget and Bruner cognitive, Vygotsky social (ZPD, scaffolding); teacher as facilitator.
- Cognitivism = inner mental processes; constructivism = learning from one's own experience.
- Metacognition = thinking about thinking (Flavell, 1976); self-regulated learning = plan, monitor, adjust (Zimmerman).
- Availability heuristic = judging likelihood by how easily examples come to mind (Tversky and Kahneman, 1973).

5 Social learning (Bandura) and motivation (Maslow)

Albert Bandura showed that children learn a great deal by watching others (models) and what happens to them, through attention, retention, reproduction and motivation, and later built this into social cognitive theory with self-efficacy (belief in one's own ability) at its centre; motivation is the force that starts, directs and keeps up behaviour, and Maslow arranged human needs in a hierarchy from physiological needs to self-actualisation.

Core facts

Bandura and social learning

- **Albert Bandura** (1925 to 2021), Canadian-born American psychologist at **Stanford University**. Theory: **social learning theory** (also called **observational learning, imitation, modelling** or **vicarious learning**). He added two things to behaviourism: **mediating (cognitive) processes** between stimulus and response, and **learning by observing** the environment; so his theory is called the **bridge between behaviourism and cognitive theory**. Behaviour can be **learnt without the learner himself being reinforced**.
- **Bobo doll experiment** (Bandura, Ross and Ross, **1961**, Stanford nursery school): children who watched an adult hit an inflatable Bobo doll later copied the same aggression; children who saw a calm model were much less aggressive. Imitation was **highest when the model was rewarded** and **lowest when the model was punished**; merely seeing the act was enough to learn it.
- **Books:** *Social Learning and Personality Development* (with Richard Walters, **1963**); *Aggression: A Social Learning Analysis* (1973); *Social Learning Theory* (1977); *Social Foundations of Thought and Action: A Social Cognitive Theory* (1986); *Self-Efficacy: The Exercise of Control* (1997)**.
- **Four processes of observational learning** (in this order): **Attention → Retention → (Motor) Reproduction → Motivation**.
- **Vicarious reinforcement:** seeing a model **rewarded** makes the observer more likely to copy; **vicarious punishment:** seeing a model punished makes it less likely. **Self-reinforcement:** rewarding oneself against one's own standard.
- **Types of models:** **live** (parent, teacher, peer), **symbolic** (film, TV, book, cartoon character), **verbal instructional** (a description of how to act).
- **Reciprocal determinism** (triadic): **Person** (thoughts, beliefs) ↔ **Behaviour** ↔ **Environment** all influence one another.
- **Social cognitive theory** (renamed in **1986**): learning is social and cognitive; it bridges **behaviourism and cognitive psychology**.
- **Self-efficacy** = a person's **belief in his or her ability to succeed** in a particular task or situation (paper "Self-efficacy: Toward a unifying theory of behavioural change", **1977**). It is **the focal point of Bandura's social cognitive theory** (asked in 2022).
- **Four sources of self-efficacy:** (1) **mastery (performance) experiences**, the strongest; (2) **vicarious experiences** (seeing similar others succeed); (3) **verbal / social persuasion**; (4) **physiological and emotional states**.

Motivation

- **Motivation** comes from Latin **movere** = **to move**. It is an **orientation towards learning** (APPSC 2022): the inner state that **arouses, directs and sustains** activity towards a goal.
- **Definitions: J.P. Guilford**: a particular internal factor or condition that tends to **initiate and sustain** activity. **Petri (1996)**: the process by which activities are **started, directed and continued** to meet physical or psychological needs.
- **Functions**: it **energises (arouses), directs and sustains** behaviour; it does **not** decide intelligence.
- **Four indicators of motivation**: **direction** (what one chooses), **latency** (how soon one starts), **intensity** (how hard one tries), **persistence** (how long one keeps on despite obstacles).
- **Motivation cycle**: **Need** → **Drive** → **Goal-directed behaviour** → **Incentive (goal)** → **Need reduced**. **Need** = a bodily lack (tissue deprivation: no food); **drive** = the aroused tension it produces (hunger); **incentive** = the outside goal object (food, a prize, marks). **Homeostasis** (Walter B. **Cannon**, *The Wisdom of the Body*, **1932**) = the body's tendency to keep its inner conditions in balance; a disturbed balance creates a drive.
- **Kinds of motives**: **primary / biological** (innate: hunger, thirst, sleep, pain avoidance, sex) and **secondary / psychosocial / acquired** (learnt: achievement, affiliation, power, status, approval); a third group, **general motives**, covers **curiosity, exploration and the need for sensory stimulation**.
- **Positive (incentive) motivation** works through reward; **negative (fear) motivation** works through force or threat and breeds anger and frustration. A reward motivates only when the learner **values it and expects to get it** (incentive value).
- **Intrinsic motivation**: the activity is its own reward (curiosity, interest, joy of mastery). **Extrinsic motivation**: the reward is outside the task (marks, prizes, praise, punishment, a job). **Intrinsic is more lasting** and is the better aim for a teacher.
- **Abraham H. Maslow** (1908 to 1970), American, founder figure of **humanistic psychology** (the "**third force**", after psychoanalysis and behaviourism). Paper "**A Theory of Human Motivation**" (***Psychological Review*, 1943); **book** *Motivation and Personality* (1954)*; *Toward a Psychology of Being** (1962).
- **Maslow's hierarchy (lowest to highest)**: **1 Physiological** → **2 Safety (security)** → **3 Love and belongingness (social)** → **4 Esteem** → **5 Self-actualisation**. A higher need becomes strong only when the lower ones are fairly well met; **physiological** needs must be met **first**.
- **Deficiency needs (D-needs)**: the lower four. **Growth / being needs (B-needs)**: self-actualisation (later extended).
- **Self-actualisation** = becoming everything one is capable of becoming ("what a man **can** be, he **must** be"); only about **1%** of people reach it; such people have **peak experiences** (Maslow's examples: Lincoln, Einstein, Eleanor Roosevelt).
- **Esteem** has two levels: **respect, status and reputation from others** (lower) and **self-esteem** based on real competence (higher).
- **Achievement motivation (need for achievement, n-Ach)**: the wish to do well against a standard of excellence. **Henry Murray** listed it among human needs (1938) and measured needs with the **TAT (Thematic Apperception Test)**; **David McClelland** studied it in depth (*The*

Achievement Motive, 1953; ***The Achieving Society*, 1961) with n-Ach, n-Aff (affiliation), n-Pow (power)**.

- **High achievers** prefer tasks of **moderate difficulty**, want **quick feedback** and take personal responsibility (J.W. **Atkinson's** expectancy-value theory).
- **Level of aspiration**: the **standard or goal a person expects to reach** in a task, judged from past performance. First experiments: **Ferdinand Hoppe (1930)** in **Kurt Lewin's** group; **success raises** the level of aspiration and **failure lowers** it. A healthy level is set **a little above** present performance.
- **William McDougall** (*An Introduction to Social Psychology*, **1908**): **instinct theory**: all behaviour springs from inborn, purposive **instincts**, each paired with an **emotion** (**flight-fear**, **pugnacity** (**combat**)–**anger**, **curiosity-wonder**, **repulsion-disgust**); each instinct has a **cognitive** (perceiving), **affective** (feeling) and **conative** (striving, acting) side.
- **Freud**: two basic instincts, **Eros** (life, love) and **Thanatos** (death, aggression); **unconscious** motives show in **dreams** and **slips of the tongue**. **Alfred Adler**: the **striving for superiority** (power) to overcome feelings of inferiority.
- **Alderfer's ERG theory (1969)**: Maslow's five levels reduced to **Existence, Relatedness, Growth**. **Herzberg (1959)**: **hygiene factors** (salary, job security, working conditions) only prevent dissatisfaction; **motivators** (achievement, recognition, the work itself) give satisfaction.

Explained

1. Four processes of observational learning, with a classroom example (a student learning to solve a sum by watching the teacher)

Process	What happens	Teacher's job
Attention	the learner notices the model	a clear, liked, competent model; point out key steps
Retention	the act is stored as images or words	summarise, rehearse, give memory cues
Reproduction	the learner tries the act	guided practice, correct errors
Motivation	the learner chooses to perform it	praise, show the model's success

2. Learning vs performance. Bandura showed that a child can **learn** a behaviour by watching and still **not perform** it until there is a reason. In the Bobo doll follow-up (1965), children who saw the model punished copied less, but when offered a reward they could all reproduce the aggression: they had learnt it. This is why observational learning is called "**no-trial learning**": no practice or direct reinforcement is needed for learning to occur.

- **Attention** depends on the model's **distinctiveness** and **complexity**, the observer's **sensory capacity** and **past reinforcement**. **Reproduction** is limited by the observer's physical ability and skill.
- **Mirror neurons** (they fire both when we act and when we watch the same act) give **biological support** to observational learning.

3. Effects of modelling

Effect	Meaning	Example
Observational learning	a new behaviour is acquired	learning a new dance step
Inhibitory	a behaviour is held back after the model is punished	not copying a classmate who was scolded
Disinhibitory	a held-back behaviour is released when the model goes unpunished	breaking a rule after seeing others do it freely
Response facilitation	an already known act is prompted	joining a queue because others do

4. A model is copied more when the model is **of high status, competent, similar** to the learner (same age, sex), warm and rewarded. Teachers, parents, film heroes and older students are powerful models: **the teacher teaches more by example than by precept.**

- **Identification** = taking on a model's many behaviours, **values and attitudes**; **imitation** = copying **one particular** behaviour.
- **Neal Miller and John Dollard** (*Social Learning and Imitation*, **1941**) had earlier explained imitation as a learnt, reinforced response; Bandura added cognition and vicarious reinforcement.

5. Self-efficacy is not self-esteem. Self-efficacy is task-specific ("I can solve these equations"); self-esteem is a general feeling of self-worth. Students with high self-efficacy choose harder tasks, try longer and recover from failure. **Collective efficacy** = a group's shared belief that it can succeed (a class, a school staff).

6. Maslow's hierarchy in a hostel and school

Level	Need	What the hostel / school provides
1 Physiological	food, water, sleep, warmth	midday meal, hostel food, rest
2 Safety	security, order, freedom from fear	a safe campus, fair rules, no corporal punishment
3 Belongingness	love, friendship, acceptance	a caring warden and teacher, group work
4 Esteem	respect, recognition, competence	praise for effort, responsibilities
5 Self-actualisation	full use of one's potential	clubs, projects, creative work

A hungry or frightened child cannot attend to lessons: this is the simplest exam application of Maslow.

Extrinsic motivation links mainly with the **lower needs** (physiological, safety, social), **intrinsic motivation** with **esteem and self-actualisation** (APPSC 2022; see Common traps on its key).

- **Physiological needs** are the only ones that can be **fully satisfied**, and they keep coming back.
- **Criticism of Maslow:** too optimistic; drawn from **healthy, successful** people; people sometimes pursue higher needs before lower ones are met.

7. Intrinsic vs extrinsic motivation

Point	Intrinsic	Extrinsic
Source	inside the task / learner	outside (reward, fear, marks)
Example	reading a story for pleasure; gardening because it is relaxing (APPSC 2019); solving puzzles for fun	studying for a prize; stars, marks, fear of punishment
Lasts	long	as long as the reward lasts
Teacher's use	the aim	a starter, then fade it out

8. Other names in motivation

- **William McDougall: instinct theory** (instincts, each with an emotion; 1908).
- **Clark Hull: drive-reduction** theory (behaviour reduces a drive).
- **Yerkes and Dodson (1908)**: performance is best at a **moderate level of arousal** (an inverted U); too little or too much anxiety lowers performance; for difficult tasks the best level is lower.
- **E.B. Hurlock (1925)**: among three groups of children, the **praised** group improved most, the **reproved** group less, and the **ignored** group least: **praise works better than blame, and both beat neglect**.
- **Bernard Weiner: attribution theory**: the causes people give for success or failure (ability, effort, luck, task difficulty) differ in **locus** (internal or external), **stability** and **controllability**. "I failed because I have **no ability**" = internal, stable, uncontrollable (leads to hopelessness); "I **did not study enough**" = internal, unstable, controllable (keeps the learner trying). So teachers should praise **effort**.
- **Frederick Herzberg (1959)**: two-factor theory of work motivation (hygiene factors vs motivators).
- **Three schools on motivation: behaviourists** = **extrinsic** (reinforcement); **cognitivists** = **intrinsic** (the learner's goals, interest, beliefs); **social constructivists** = **both**.

9. How a teacher motivates a class

- Arouse **curiosity and interest** (a puzzle, a story, a demonstration); link the lesson to the child's life and needs.
- Set **clear, short-term goals** and give **knowledge of results** (quick feedback, for example the test returned next day with a comment on each mistake): a child who knows his progress tries harder. Programmed instruction builds this in (immediate confirmation of every response).
- Use **praise and reward** wisely: more praise than blame; praise that is **immediate, sincere and specific** about the effort or work; avoid harsh punishment, which only suppresses behaviour.
- Give **experiences of success**: grade tasks from easy to hard so that each child succeeds; success breeds success.
- Help each child set a **realistic level of aspiration**, neither too high (repeated failure) nor too low.
- Use **co-operation** and healthy **competition**, especially **competition with one's own past record** (self-competition).
- Vary methods and use **audio-visual aids**, activities, projects and play.
- Be a good **model**; build **self-efficacy** through mastery and encouragement.
- Meet basic needs first (food, safety, belonging) as Maslow suggests: a hostel child who comes to class **without breakfast** must be fed before he can attend; a **lonely** newcomer needs belonging (group

activities, a buddy).

- Apply **Thorndike's law of readiness**: arouse interest and readiness **before** teaching.

10. The body's side of motivation

- **Hunger** is controlled by the **hypothalamus**: damage to the **lateral hypothalamus** → refusal to eat (**aphagia**); damage to the **ventromedial hypothalamus (VMH)** → overeating and obesity (**hyperphagia**).
- **Thirst** has two controls: **osmotic** (cells lose water: salty food) and **volumetric** (blood volume falls: vomiting, diarrhoea, bleeding).
- Eating and drinking are **regulatory** (homeostatic) motives; sex is **non-regulatory**.
- **Achievement** motivation rises when parents encourage and praise effort; the **affiliation** motive rises when people feel threatened or helpless; McClelland linked a society's high n-Ach with faster **economic development**.

Common traps

✗ "Social learning theory was developed by Skinner (or Pavlov, or Maslow)." ✓ **Albert Bandura**.

✗ "Self-efficacy is the focal point of Dewey's (or Skinner's) theory." ✓ **Bandura's social cognitive theory**.

✗ "Learning through imitation is insight learning." ✓ It is **social / observational learning** (insight learning is Köhler).

✗ "Bandura's order: retention, attention, motivation, reproduction." ✓ **Attention → Retention → Reproduction → Motivation**.

✗ "Observational learning needs direct reinforcement of the learner." ✓ **Vicarious** reinforcement is enough; learning can occur with no reward at all.

✗ "Maslow's order: physiological, social, safety, esteem, self-actualisation." ✓ **Safety comes before love and belongingness**.

✗ "Self-actualisation is a deficiency need." ✓ It is a **growth (being) need**; the lower four are deficiency needs.

✗ "Maslow was a behaviourist." ✓ A **humanistic** psychologist (third force).

✗ "Extrinsic motivation is better for lasting learning." ✓ **Intrinsic** motivation lasts longer; extrinsic is a starter.

✗ "Achievement motivation: McClelland used the Rorschach test." ✓ The **TAT** (Murray's Thematic Apperception Test).

✗ "High achievers choose the hardest tasks." ✓ **Moderately difficult** tasks.

✗ "Failure raises the level of aspiration." ✓ **Success raises it, failure lowers it.**

✗ "Extrinsic motivation goes with the safety need only." ✓ Standard texts link extrinsic motivation with the **lower needs as a group** (physiological, safety, belonging) and intrinsic with esteem and self-actualisation. APPSC's 2022 final key chose "**safety**"; if an option says lower or deficiency needs, prefer it.

✗ "Need, drive and incentive are the same thing." ✓ **Need** = bodily lack; **drive** = aroused inner tension; **incentive** = the outside goal.

✗ "Latency = how hard a person tries." ✓ **Latency** = how soon one starts; **intensity** = effort; **persistence** = keeping on.

✗ "Thanatos is Freud's life instinct." ✓ **Eros** = life; **Thanatos** = death and aggression.

✗ "In Herzberg's theory salary is a motivator." ✓ Salary, security and conditions are **hygiene factors**; achievement and recognition are **motivators**.

✗ "Imitation and identification mean the same." ✓ Imitation copies **one** behaviour; identification takes on the model's **values and many behaviours**.

✗ "Every book gives McDougall the same number of instincts." ✓ BRAOU Foundations of Psychology says **12, later 18**; most Indian B.Ed. books give **14**, each with an emotion; in 1932 he spoke of 18 "propensities". Learn the **pairs** (flight-fear, pugnacity-anger, curiosity-wonder).

Quick revision

- Bandura (Stanford): social learning = observational learning, modelling, imitation; bridge between behaviourism and cognitive theory; Bobo doll 1961.
- Processes: Attention → Retention → Reproduction → Motivation; vicarious reinforcement; live, symbolic and verbal models.
- Social Learning Theory 1977; Social Cognitive Theory 1986 (reciprocal determinism P-B-E); Self-Efficacy 1997.
- Self-efficacy = belief in ability to succeed; sources: mastery (strongest), vicarious, persuasion, emotional state.
- Motivation: from *move*; arouses, directs, sustains; indicators: direction, latency, intensity, persistence.
- Need → drive → goal-directed behaviour → incentive; homeostasis (Cannon 1932); intrinsic lasts longer.
- McDougall 1908: instincts with emotions (flight-fear); Freud: Eros and Thanatos; Adler: striving for superiority.
- Maslow 1943 / 1954: physiological → safety → belonging → esteem → self-actualisation; lower four deficiency, top growth; about 1% reach it.

- Achievement: Murray, McClelland (n-Ach, n-Aff, n-Pow; TAT), moderate risk; Herzberg hygiene vs motivators; Alderfer ERG.
- Level of aspiration: Hoppe 1930, success raises, failure lowers; Hurlock 1925: praise > reproof > ignoring; Yerkes–Dodson: moderate arousal best.

6 Methods of teaching: maxims, stages, inductive, heuristic, project and Dalton plan

Teaching is a tripolar process (teacher, child, curriculum) whose aim is an inquiring mind; it follows maxims (known to unknown, concrete to abstract), passes through pre-active, interactive and post-active stages, and uses methods that make the pupil active: inductive, heuristic (Armstrong), project (Kilpatrick), the Dalton plan (Parkhurst) and programmed learning (Skinner).

Core facts

- **Teaching as a process:** John **Adams** called education **bipolar** (teacher and pupil); John **Dewey** made it **tripolar: child, teacher and curriculum** (the social setting) (APPSC 2019).
- **Aims (APPSC 2019):** the main aim of classroom teaching is to develop an **inquiring mind**; the teacher's target is to **develop talents** in students; good teaching is best shown by **meaningful questions asked by students**.
- **Maxims of teaching** (rules drawn from the laws of learning): **known to unknown, simple to complex, concrete to abstract, particular to general, easy to difficult, whole to part, analysis to synthesis, empirical to rational, psychological to logical, seen to unseen** (near to far). What is "simple" is judged from the **child's** point of view, not the adult's.
- **Stages of teaching** (Philip W. **Jackson**, *Life in Classrooms*, **1968**): **pre-active** (planning before class), **interactive** (teaching in class), **post-active** (evaluation and reflection after class).
- **Herbartian five steps** (Herbart's followers): **preparation** → **presentation** → **association (comparison)** → **generalisation** → **application**.
- **Inductive method: particular** → **general**, examples first, the rule found by the pupils; also called the **formula-construction** method. **Deductive method: general** → **specific**: the rule or formula is given first and then applied (APPSC 2019). **Inducto-deductive**: find the rule by induction, practise it by deduction.
- **Heuristic method**: advocated by **H.E. Armstrong** (chemist) (APPSC 2019); from Greek **heurisko, "I find out"; the pupil is put in the position of a discoverer**.
- **Project method: W.H. Kilpatrick (1918)**, Dewey's student, based on **pragmatism** (learning by doing); refined by **J.A. Stevenson**. Kilpatrick: a project is **"a whole-hearted purposeful activity proceeding in a social environment"**.
- **Kilpatrick's four types of project: producer (constructive), consumer (appreciation), problem, drill (specific learning)**.
- **Dalton plan: Helen Parkhurst, 1920**, at **Dalton, Massachusetts** (APPSC 2019): pupils take **monthly assignments (contracts)** and work at their own pace in **subject laboratories**.
- **Winnetka plan: Carleton Washburne, 1919**, Winnetka (Illinois): self-paced work on **common essentials** plus **group and creative activities**.
- **Programmed instruction**: linear (**Skinner**), branching (**Crowder**), mathetics (**Gilbert**); see EDU-LR-03.

- **Models of teaching** (Bruce **Joyce** and Marsha **Weil**): the **concept attainment model** is built on Bruner's discovery learning (Bruner, Goodnow and Austin) (APPSC 2019); the **advance organiser model** comes from **Ausubel**.
- **Edgar Dale's Cone of Experience (1946)**: **direct, purposeful experiences** at the base (most concrete) up to **verbal symbols** at the top (most abstract).
- **Theories of discipline**: **repressionistic** (control by fear and punishment), **impressionistic** (influence of the teacher's personality and example), **emancipationistic** (freedom; the child learns from natural consequences; naturalism, Rousseau).

Explained

1. The maxims with examples

Maxim	What it means	Classroom example
Known to unknown	start from what pupils already know	from the village market to the national economy
Simple to complex	easy parts first, as the child sees them	letters, then words, then sentences
Concrete to abstract	real things before symbols	cut a roti into halves before writing $\frac{1}{2}$
Particular to general	examples before the rule	measure several triangles, then state the angle-sum rule
Whole to part	the whole first, then its parts	read the whole poem, then each stanza
Analysis to synthesis	break a problem down, then put it together	steps of a geometry proof
Empirical to rational	observed facts before reasons	see iron rust, then learn why
Psychological to logical	the child's interest first, the subject's order later	begin a lesson from a hostel event

The maxims go back to **Comenius** and **Pestalozzi**; **Herbert Spencer** (*Education*, 1861) set several of them out.

2. Jackson's three stages of teaching

Stage	When	Teacher's tasks
Pre-active	before entering the class	set objectives, choose content, methods and aids, plan the lesson
Interactive	in the class	present, question, explain, give feedback, manage the class
Post-active	after the class	evaluate pupils, reflect on the lesson, plan remedial work

3. Herbartian steps. J.F. **Herbart** gave the **formal steps** of instruction; his followers made the five-step lesson plan used for knowledge lessons: **preparation** (link to old knowledge, state the aim), **presentation** (new matter), **association** (compare with what is known), **generalisation** (draw the rule), **application** (use

it in new cases). The theory behind it is Herbart's **apperception**: new ideas are learnt through ideas already in the mind.

4. Inductive vs deductive

Point	Inductive	Deductive
Direction	particular → general; examples → rule	general → particular; rule → examples
Pupil	active; discovers the rule	receives the rule and applies it
Speed	slow, but understanding is deep	quick; covers the syllabus faster
Best for	finding a new rule or formula	practice, drill, application

Good teaching usually moves **from induction to deduction** (the inducto-deductive approach).

5. The heuristic method

- **Stages:** planning, execution, conclusion. The teacher sets a problem; pupils find out by experiment, observation and reading; the teacher guides, does not tell.
- **Merits:** builds a **scientific attitude**, self-reliance, training in method and lasting learning.
- **Limits:** **slow**; needs **able teachers**, well-equipped rooms and **small classes**; unsuited to young children; suits the **middle and high school** stage.

6. The project method

- **Other definitions:** **Ballard**: a project is "a bit of **real life** imported into the school"; **Stevenson**: "a **problematic act** carried to completion in its **natural setting**".
- **Steps:** providing a situation → **choosing (purposing)** → **planning** → **executing** → **evaluating (judging)** → recording. Short form: **purposing, planning, executing, judging**.
- **Principles:** **purpose, activity** (learning by doing), **reality** (learning by living), **utility, freedom, socialisation** (co-operation). It **rejects rote memorisation**.

Type	Aim	Example
Producer (constructive)	make a concrete product	a working model of a village water tank
Consumer (appreciation)	enjoy an experience	listening to a story, watching a play
Problem	solve an intellectual problem	why is the hostel well water salty?
Drill (specific learning)	gain a skill	improve handwriting speed

- **Merits:** real-life, purposeful, co-operative learning; links subjects. **Limits:** time-consuming, costly, hard to cover the full syllabus, needs a resourceful teacher.

7. Individualised plans

Plan	Founder, year	Key features
Dalton plan	Helen Parkhurst, 1920	monthly assignments (contracts); subject laboratories; self-pacing; teacher as adviser

Plan	Founder, year	Key features
Winnetka plan	Carleton Washburne, 1919	common essentials at the pupil's own pace + group creative activities
Programmed learning	B.F. Skinner, 1954	small frames, active response, immediate feedback (EDU-LR-03)

8. Other methods in brief

- **Lecture:** teacher talks, pupils listen; quick and economical, but pupils are **passive**; suits higher classes and new topics.
- **Demonstration:** the teacher **shows** an experiment or process while explaining; common in science; a **lecture-cum-demonstration** combines the two.
- **Discussion and Socratic questioning:** pupils think through questions and answers.
- **Problem-solving method** (Dewey): felt difficulty → defining the problem → hypotheses → reasoning → testing and conclusion.
- **Discovery learning** (Bruner, EDU-LR-04) and **play-way** (Froebel's kindergarten) put the child at the centre.

9. Teaching aids and resources

- **Dale's cone** (from concrete to abstract): direct purposeful experiences; contrived experiences (models, mock-ups); dramatised experiences; demonstrations; field trips; exhibits; motion pictures and television; recordings, radio, still pictures; visual symbols (charts, maps); verbal symbols (words).
- **Three-dimensional aids: models, globes, dioramas, specimens.** A **museum**, zoo or field trip is a **community resource** (a place for educational visits), not itself a 3-D aid (APPSC 2019).

10. Classroom discipline

Theory	Basis	Link
Repressionistic	fear, strict control, punishment	old authoritarian schools
Impressionistic	the teacher's personality and example	idealism
Emancipationistic	freedom; natural consequences	naturalism, Rousseau

- The modern aim is **self-discipline**. If two pupils quarrel in class, the teacher **calmly stops** it, **continues the lesson**, and talks to both **later** to find the cause.
- Evaluation tied to teaching: **assessment for learning** (formative) is the **prerequisite** that guides teaching; **summative** evaluation comes at the **end** of a course; in Bloom's 1956 taxonomy **evaluation** is the highest cognitive level (details: EDU-ST-02).

Common traps

✗ "The heuristic method was given by Kilpatrick." ✓ Heuristic = **H.E. Armstrong**; project = **Kilpatrick**; Dalton plan = **Helen Parkhurst**.

X "In the deductive method teaching goes from particular to general." ✓ Deductive = **general to specific**; inductive = particular to general.

X "From abstract to concrete is a maxim of teaching." ✓ The maxim is **concrete to abstract**.

X "The Dalton plan was developed by Washburne." ✓ Dalton = **Parkhurst (1920)**; Winnetka = **Washburne (1919)**.

X "The project method is based on idealism." ✓ It rests on **pragmatism** (Dewey, learning by doing).

X "Survey is one of Kilpatrick's four types of project." ✓ The four are **producer, consumer, problem, drill**.

X "A museum is a three-dimensional teaching aid." ✓ Models, globes and dioramas are 3-D aids; a museum is a **community resource**.

X "The pre-active stage is the teaching in class." ✓ Pre-active = **planning**; interactive = **in class**; post-active = **evaluation and reflection** (Jackson).

X "Teaching is a bipolar process (Dewey)." ✓ **Adams** = bipolar; **Dewey** = **tripolar** (child, teacher, curriculum).

X "The inductive method covers the syllabus faster." ✓ The **deductive** method is faster; the inductive is slow but thorough.

X "'To teach is to engage students in learning', so the teacher's challenge is maintaining discipline: the only possible answer." ✓ The stem fits **making teaching and learning enjoyable** just as well; APPSC's 2022 final key chose **maintaining discipline**, so treat that key as doubtful.

Quick revision

- Teaching: Adams bipolar; Dewey tripolar (child, teacher, curriculum); aim = inquiring mind.
- Maxims: known → unknown, simple → complex, concrete → abstract, particular → general, whole → part; judged from the child's side.
- Jackson 1968: pre-active (plan), interactive (teach), post-active (evaluate).
- Herbartian steps: preparation, presentation, association, generalisation, application.
- Inductive: examples → rule (slow, deep); deductive: rule → examples (quick).
- Heuristic: H.E. Armstrong; heurisko = I find out; pupil as discoverer.
- Project: Kilpatrick 1918, pragmatism; "whole-hearted purposeful activity"; producer, consumer, problem, drill.
- Dalton plan: Helen Parkhurst 1920, assignments, subject laboratories; Winnetka: Washburne 1919.
- Dale's cone 1946: direct experience at the base, verbal symbols at the top; museum = community resource.

- Discipline: repressionistic (fear), impressionistic (teacher's example), emancipationistic (freedom).