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CUET · PSYCHOLOGY · CLASS XI · CODE 324

# Thinking

CUET unit: Thinking (Cognitive Processes — Problem Solving, Reasoning, Decision-making, Creative Thinking, Language & Thought)

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# 📌 Snapshot

- Establishes thinking as a higher mental process — manipulation and analysis of information through abstracting, reasoning, imagining, problem solving, judging and decision-making.
- Introduces mental images and concepts as the two building blocks of thought, and contrasts analytical (American) versus holistic (Asian) cultural styles.
- Walks through the seven mental operations of problem solving and the two big obstacles — mental set and functional fixedness.
- Distinguishes deductive vs inductive reasoning, judgment vs decision-making, and convergent vs divergent thinking, then maps the four-stage creative process (preparation → incubation → illumination → verification).
- Closes with the three viewpoints on thought–language link (Whorf's linguistic relativity, Piaget's thought-precedes-language, Vygotsky's separate-then-merging origins) and Skinner vs Chomsky on language acquisition.

# 📖 Detailed Notes

## 2.1 Core concepts

NCERT Chapter 7 frames **thinking** as the base of all cognitive activities — a higher mental process of manipulating and analysing acquired or existing information by means of abstracting, reasoning, imagining, problem solving, judging and decision-making (NCERT §Nature of Thinking, p. 110). Thinking, is mostly **organised and goal-directed**; it is an internal mental process that cannot be observed directly and can only be **inferred from overt behaviour** — much as one infers a chess player's strategy from his next move. Two **building blocks** underpin all thought. A **mental image** is a mental representation of a sensory experience used to think about things, places and events even when the object itself is absent (NCERT §Building Blocks of Thought, p. 111). A **concept** is a mental representation of a category — a class of objects, ideas or events that share common properties; concept formation makes thought quick and efficient by organising knowledge into manageable units (NCERT §Building Blocks of Thought, p. 112). Box 7.1 (p. 112) draws a powerful cultural contrast: when shown an aquarium scene, **American observers** typically focus on the biggest or brightest fish (**analytical thinking**), while **Asian observers** (Japanese, Chinese, Korean) attend to the relationship between the fish and the background (**holistic thinking**).

**Problem solving** is goal-directed thinking that connects an initial state (the problem) with an end state (the goal) through several mental operations (NCERT §Problem Solving, p. 113). NCERT Table 7.1 (p. 113) lists **seven mental operations**: (1) identify the problem, (2) represent the problem in one's mind, (3) plan the solution / set sub-goals, (4) evaluate all the solutions thought of, (5) select and execute one solution, (6) evaluate the outcome, and (7) rethink and redefine problems and solutions if needed. Two major obstacles slow problem solving. **Mental set** is the tendency to solve problems by following already-tried mental operations or steps — creating mental rigidity. **Functional fixedness** is the failure to solve a problem because one is fixed on a thing's usual function (for example, seeing a book only as something to read and not as a doorstop). Lack of motivation is a third, less specific obstacle (NCERT §Obstacles to Solving Problems, pp. 113-114).

There are two forms of reasoning. **Deductive reasoning** begins with a general assumption and draws specific conclusions (general → particular); the classical example is the syllogism "All cats have four legs; X has four legs; therefore X is a cat" (Fig. 7.3, p. 115) — an instance of flawed deduction because the middle term is illegitimately distributed. **Inductive reasoning** draws a general conclusion from particular observations (particular → general); NCERT explicitly states that most cases of scientific reasoning are inductive in nature, with scientists building general rules from a number of instances (NCERT §Reasoning, pp. 114-115). A further form of reasoning is **analogy**, a four-part structure of the form "A is to B as C is to D" — for example, water is to fish as air is to humans. Analogies help in identifying the salient attributes that connect concepts.

Two further distinctions are central to higher cognition. **Judgment** is the drawing of conclusions, forming of opinions and evaluating things based on knowledge and evidence. **Decision-making** is the choice among alternatives by evaluating the cost and benefit of each. The two processes are interrelated — most decisions follow judgments — but distinct in their goals (NCERT §Decision-making, p. 116).

**Creative thinking** produces novel and original ideas. Bruner characterised creativity by the phrase **"effective surprise"**; research adds that genuinely creative thinking must be **reality-oriented, appropriate, constructive** and **socially desirable** (NCERT §Nature of Creative Thinking, p. 117). **J.P. Guilford** distinguished two kinds of thinking. **Convergent thinking** is required to solve problems with only one correct answer (e.g., finding the next number in 3, 6, 9, ⋯); **divergent thinking** is the open-ended generation of many possible answers and is characterised by four abilities — **fluency** (number of ideas), **flexibility** (variety of categories), **originality** (uncommonness) and **elaboration** (level of detail). **Edward de Bono's lateral thinking** corresponds closely to Guilford's divergent thinking; de Bono contrasted **vertical thinking** (digging the same hole deeper) with **lateral thinking** (looking for alternative ways) and developed the **Six Thinking Hats** technique — white (information), red (feelings), black (judgment), yellow (positives), green (creativity), blue (process) (NCERT Box 7.2, p. 118).

The **creative process** unfolds in four classic stages (NCERT §Process of Creative Thinking, pp. 118-119): (1) **Preparation** — understanding and analysing the task; (2) **Incubation** — relaxing from conscious effort, allowing the unconscious to work; (3) **Illumination** — the sudden "Aha!" moment when the solution appears; and (4) **Verification** — testing the worth of the new idea via convergent thinking. Two strategies enhance creative output: increasing awareness and generating large numbers of ideas. The most widely used technique is **Alex Osborn's Brainstorming**, which separates idea production from idea evaluation so that critical judgment does not stifle generation (NCERT §Strategies for Creative Thinking, p. 119).

The last block addresses the **relationship between thought and language**. Three classical positions are contrasted (NCERT §Thought and Language, pp. 120-121). **Benjamin Lee Whorf's linguistic relativity hypothesis** (also called linguistic determinism) holds that language determines what and how individuals can think — speakers of different languages think differently because of grammatical and lexical differences. **Jean Piaget's** position is the reverse — thought precedes and determines language; children develop cognitive structures first and then acquire language to express them. **Lev Vygotsky** argued that thought and language develop in a child separately until about two years of age, after which they merge and become interdependent. **Language** has three defining characteristics — **symbols, a set of rules, and communication**; it is a rule-governed system of symbols used to communicate with others (NCERT p. 121).

Language development proceeds through identifiable stages (NCERT §Development of Language, pp. 121-122): **crying** (birth onwards) → **cooing** (vowel-like sounds: aaa, uuu) → **babbling** (~6 months: da-, ba-) → **echolalia** (~9 months, repetition of others' sounds) → **one-word stage / holophrases** (~1 year; single words that stand for whole sentences) → **two-word stage / telegraphic speech** (18-20 months, mostly nouns and verbs as in "send money") → **rule-based speech** (~2.5-3 years). On the question of how language is acquired, **B.F. Skinner's** behaviourist view explains language via association, imitation and reinforcement; **Noam Chomsky** countered this with the doctrine of innate **universal grammar** and a **critical period** for language acquisition, arguing that the rate of acquisition and children's ability to produce novel sentences cannot be explained by learning alone (NCERT pp. 122-123). On the Indian context (Box 7.3, p. 122): **bilingualism** (proficiency in two languages) and **multilingualism** (proficiency in more than two languages) facilitate cognitive, linguistic and academic competence.

## 2.2 Definitions to memorise

| Term | Definition | Page |
|---|---|---|
| Image | Mental representation of a sensory experience used to think about things, places and events | 111 |
| Concept | | 112 |

| Term | Definition | Page |
|---|---|---|
| | Mental representation of a category — a class of objects, ideas or events sharing common properties | |
| Mental Set | Tendency to solve problems by following already tried mental operations or steps | 113 |
| Functional Fixedness | Failure to solve a problem because one is fixed on a thing's usual function | 114 |
| Deductive Reasoning | Reasoning that begins with a general assumption and draws specific conclusions (general → particular) | 114-115 |
| Inductive Reasoning | Drawing a general conclusion based on particular observation/facts | 115 |
| Analogy | Reasoning form involving four parts: A is to B as C is to D | 115 |
| Judgment | Drawing conclusions, forming opinions and evaluating based on knowledge and evidence | 115 |
| Decision-making | Choosing among alternatives by evaluating cost and benefit of each | 116 |
| Convergent Thinking | Thinking required to solve problems with only one correct answer | 117 |
| Divergent Thinking | Open-ended thinking producing many novel answers; abilities: fluency, flexibility, originality, elaboration | 117-118 |
| Lateral Thinking | de Bono's term for looking at alternative ways of defining/ interpreting problems | 118 |
| Six Thinking Hats | de Bono's technique with six perspectives — white, red, black, yellow, green, blue | 118 |
| Brainstorming | Osborn's technique keeping idea production separate from idea evaluation | 119 |
| Linguistic Relativity Hypothesis | Whorf's view that language determines what and how individuals can think (linguistic determinism) | 120 |
| Telegraphic Speech | Two-word stage speech (18-20 months) containing mostly nouns and verbs | 122 |
| Holophrases | One-word utterances around age 1 that stand for whole sentences/phrases | 122 |
| Echolalia | ~9-month stage in which infants repeat sounds heard from others | 122 |
| Universal Grammar | Chomsky's innate grammatical structure underlying all human languages | 123 |
| Bilingualism / Multilingualism | Proficiency in two / more than two languages | 122 |

## 2.3 Diagrams / processes to remember

- **Fig. 7.1 (p. 111):** Girl forming a mental image of a cat on a tree — illustrates how visual mental imagery represents an absent object.
- **Fig. 7.2a & 7.2b (pp. 111-112):** Map and blank map activity used in NCERT to let students experience using mental images.
- **Box 7.1 — Culture and Thinking (p. 112):** Fish-aquarium scene used by researchers to show American (analytical, foreground fish) vs Asian (holistic, background) thinking patterns.
- **Table 7.1 (p. 113):** Seven mental operations of problem solving illustrated with the Teachers' Day play example — useful for memorising the sequence.
- **Fig. 7.3 (p. 115):** Mouse arguing "All cats have four legs, I have four legs, therefore I am a cat" — flawed deductive reasoning illustrating that deduction guarantees truth only when premises are properly formed.
- **Fig. 7.4 (p. 117):** "Thinking Divergently" — multiple uses of a single object such as a pencil, illustrating fluency, flexibility, originality and elaboration.
- **Fig. 7.5 (p. 119):** The Creative Process schematic — Search Effort → Dead End → Think Again → New Direction → Creative Solution — visualising the four-stage process.
- **Activity 7.2 (p. 114) and answers (p. 125):** Anagrams (NAGMARA = ANAGRAM, etc.) and the three-bottles water problem demonstrate mental set in action.

## 2.4 Common confusions / NTA trap points

- **Deductive vs Inductive direction:** Deductive = general → particular; Inductive = particular → general. NTA often flips this.
- **Mental Set vs Functional Fixedness:** Mental set = stuck on a previously used procedure/strategy; functional fixedness = stuck on a thing's usual function (e.g. seeing a book only as something to read, not as a hammer).
- **Convergent vs Divergent / Lateral:** Convergent = single right answer (e.g. number series); divergent = many possible answers; de Bono's "lateral" maps to Guilford's "divergent," NOT to convergent.
- **Whorf vs Piaget vs Vygotsky:** Whorf — language determines thought; Piaget — thought precedes/determines language; Vygotsky — separate origins, merge around age 2.
- **Language stages order:** Crying → Cooing → Babbling → Echolalia → One-word (Holophrases) → Two-word (Telegraphic). NTA likes to swap babbling and cooing or attach the wrong age.
- **Stage labels in creative process:** Illumination is the 'Aha!' moment, NOT incubation. Incubation is the unconscious relaxation stage before illumination.

- **Skinner vs Chomsky:** Skinner = association/imitation/reinforcement explains language; Chomsky = innate universal grammar + critical period.
- **Holophrases (one-word) ≠ telegraphic speech (two-word).** Holophrases come first (around age 1), telegraphic at 18-20 months.
- **Analogy** is a form of reasoning, not a kind of memory. NTA sometimes confuses analogy with metaphor.
- **Six Thinking Hats** belongs to de Bono, not Osborn. Brainstorming = Osborn; Six Hats = de Bono.

## 2.5 Thinkers and theories at a glance

| Name | Theory / Contribution | Key idea | NCERT page |
|---|---|---|---|
| J.P. Guilford | Convergent vs divergent thinking | Two kinds of thinking — single-answer convergent and open-ended divergent (creativity) | 117-118 |
| Edward de Bono | Lateral thinking; Six Thinking Hats | Lateral thinking looks for alternative interpretations; six hats represent six perspectives | 118 |
| Alex Osborn | Brainstorming | Generate as many ideas as possible while postponing evaluation | 119 |
| Jerome Bruner | "Effective surprise" | Creative ideas are characterised by effective surprise — novelty that is appropriate and useful | 117 |
| Benjamin Lee Whorf | Linguistic relativity hypothesis | Language determines what and how individuals can think (linguistic determinism) | 120 |
| Jean Piaget | Thought precedes language | Cognitive structures develop first and then language is acquired to express them | 120-121 |
| Lev Vygotsky | Separate origins of thought and language | Thought and language develop separately until ~age 2, then merge | 120 |
| B.F. Skinner | Behaviourist account of language | Language is acquired through association, imitation and reinforcement | 122-123 |
| Noam Chomsky | Universal grammar; critical period | Language acquisition relies on innate grammatical structures; learning alone cannot explain it | 123 |

# 🎯 Practice MCQs

## 📊 PYQ Alignment

This chapter is a high-yield CUET source, contributing roughly 6-8 MCQs per year across CUET 2023-25. Recurring question patterns include direct definitions (mental set, functional fixedness, telegraphic speech, holophrases), Guilford/de Bono contrasts (convergent vs divergent/lateral), the four stages of creative thinking in sequence, and matching theorists to their thought-language positions (Whorf, Piaget, Vygotsky, Chomsky, Skinner).