

Unit 2: Cognition - perception, thinking, memory, and intelligence

Unit 2 follows information through the mind, from perceiving a scene and thinking through a problem to storing and retrieving what happened. The exam treats those steps as connected, and this guide is organized around that connection.

AP Psychology

Unit 2 - Cognition

15-25% of the exam

About 14 minutes to read

How to use this guide

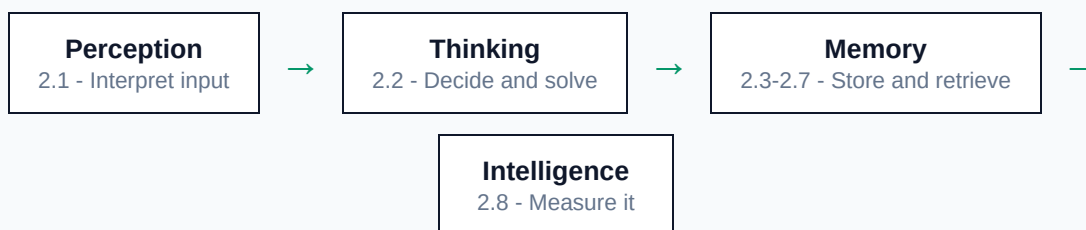
Read one section, cover the page, and say the main idea back in your own words. If you cannot say it back, reread that section only. Finish with the practice questions and the self-check before you open your notes again. The same terms are also available on Rycal as flashcards and practice questions.

What this unit is worth. Unit 2 accounts for 15 to 25 percent of the multiple-choice section, the same range as every other unit. Perception, memory, thinking, and intelligence also appear in questions from other units because they are involved in most psychological tasks.

Unit 2 is one path, not eight separate topics

The framework lists eight topics, from perception (2.1) through intelligence and achievement (2.8). Studying them as eight separate lists misses how a question about an eyewitness error can also involve attention at encoding and suggestion at retrieval. The topics are connected, and exam questions often require more than one at once.

Think of the unit as a sequence. Perception interprets incoming information, thinking works with it to solve problems or make decisions, and memory stores and retrieves it. Intelligence concerns how psychologists measure differences in those abilities and evaluate the measures.



The eight Unit 2 topics arranged as a sequence. Most exam questions focus on one step but also require you to understand the step that comes before or after it.

Perception is interpretation, not recording (2.1)

Your eyes and ears deliver raw input. Perception is the brain building a usable scene out of it, and the building goes two ways at once. **Bottom-up processing** starts with the sensory input and works upward toward meaning, the way you sound out an unfamiliar word letter by letter. **Top-down processing** starts with experience, expectations, and context and works downward, the way you read a messy handwritten note because you already know what it probably says.

Exam questions usually present a brief scenario and ask you to identify which type of processing is involved. If the scenario emphasizes prior knowledge, a schema, or a perceptual set, it describes top-down processing. If it emphasizes the features of the stimulus itself, it describes bottom-up processing. A **schema** is a mental framework that organizes what you expect to experience. A **perceptual set** is a tendency to perceive one interpretation rather than another. Both schemas and perceptual sets make perception more efficient, and both can also introduce predictable biases.

Gestalt grouping, attention, and depth

Gestalt psychologists argued that we organize scenes into wholes, not lists of parts. You separate a **figure** (the object you focus on) from its **ground** (the background), and you group elements by **proximity** (near each other), **similarity** (alike), and **closure** (filling gaps to complete a shape). When a question shows dots arranged in clusters and asks why you see groups instead of single dots, it is testing these principles, not eyesight.

Attention limits how much incoming information you can process at one time. **Selective attention** allows you to follow one conversation in a noisy room, which is known as the cocktail party effect, but it also means other information may be missed. **Inattentional blindness** refers to failing to see a visible object because your attention was directed elsewhere. **Change blindness** refers to failing to notice a change in a scene. If you miss an object that was visible the entire time, that is inattentional blindness, and if you miss a change where one thing was replaced by another, that is change blindness.

Depth perception depends on visual cues. **Binocular cues** require both eyes and include retinal disparity and convergence. **Monocular cues** can be used with one eye and include relative size, interposition, texture gradient, and linear perspective. If a scenario describes judging distance with one eye closed, binocular cues cannot explain that judgment.

A classroom example. A student says the teacher never announced the homework. The teacher wrote it on the board while the student was finishing a text to a friend. This is an example of inattentional blindness rather than a memory failure, because the information was not encoded in the first place. That distinction becomes important again when you study forgetting later in this unit.

Thinking runs on shortcuts, and the shortcuts have names (2.2)

An **algorithm** is a step-by-step method that guarantees a correct answer if you finish it. A **heuristic** is a shortcut that is usually right and sometimes wrong in a specific, testable way. Almost every thinking question in this unit asks you to spot which shortcut a person used, or which trap the shortcut led them into.

The **representativeness heuristic** involves judging how likely something is by how well it matches a prototype. For example, a quiet student who likes puzzles may be judged more likely to be a chess club member than a cheerleader, even if the cheer squad is ten times larger. In cases like this, information about how common each group actually is tends to be ignored. The **availability heuristic** involves judging likelihood by how easily examples come to mind. After local news covers a plane crash, people often rate flying as riskier than driving because images of crashes are easy to retrieve. This is an example of a memory process affecting how a thinking task is performed.

The traps that follow

- **Confirmation bias** - seeking and remembering evidence that supports what you already believe.
- **Mental set** - approaching a new problem with strategies that worked on old problems, even when a simpler approach exists.
- **Functional fixedness** - seeing an object only in its usual function, so a box that holds tacks never becomes a platform for a candle.
- **Framing** - the way a choice is worded can change the decision. For example, a treatment described as having a 90% survival rate tends to sound better than the same treatment described as having a 10% mortality rate.
- **Gambler's fallacy** - treating independent random events as if past outcomes change the odds. Five heads in a row does not make tails due.
- **Sunk cost fallacy** - staying with a failing choice because of what you already spent on it, rather than what it will cost and give you from here.

Two additional distinctions are also covered in this topic. **Convergent thinking** involves narrowing options toward a single correct answer, which is what most standardized tests require. **Divergent thinking** involves generating many possible answers, which is what brainstorming tasks and many measures of creativity require. **Executive functions** is the general term for mental processes involved in planning, inhibition, and task switching that help coordinate the steps of a multi-step problem.

How to tell them apart on a question. If the description involves a slow, step-by-step method that guarantees a correct answer, it refers to an algorithm. If it involves a faster shortcut that is usually correct but can lead to errors, it refers to a heuristic. When both terms appear as answer choices, the scenario usually describes a heuristic.

Memory is sorted by what you can say and what you can do (2.3-2.5)

Explicit memory holds facts and events you can state in words. Inside it, **episodic memory** covers events from your own life, and **semantic memory** covers general knowledge that is not tied to one moment, like the capital of France. **Implicit memory** shows up in performance without conscious recall. **Procedural memory**, the exam workhorse inside implicit memory, covers skills such as typing, riding a bike, or playing a scale on the piano. If a patient can learn a skill but cannot remember the practice sessions, implicit memory is intact and explicit memory is not.

These types of memory differ in how long information is held and how much can be held. **Sensory memory** is the brief initial holding area, called iconic memory for visual input, lasting a fraction of a second, and echoic memory for sound, lasting about three to four seconds. **Short-term memory** holds roughly seven items, give or take two, for about twenty to thirty seconds without rehearsal. **Working memory** refers to the same brief storage system when information is also being actively used. Holding a phone number briefly is an example of short-term memory, while holding it and also reversing it or adding it to a total involves working memory, which is coordinated by the central executive with a phonological loop for speech-based material and a visuospatial sketchpad for images and spatial information.

Long-term memory has no practical capacity limit for the purposes of this course, so the important question is how information moves into long-term storage. **Automatic processing** encodes information about space, time, frequency, and familiar word meanings without deliberate effort. **Effortful processing** involves deliberate strategies such as rehearsal, organization, and connecting new material to what you already know. The framework also refers to **long-term potentiation**, which is the strengthening of synapses after repeated firing, as the biological process that supports storage.

Episodic vs. semantic

Episodic is your first day at a new school. Semantic is knowing that schools have principals. Both are explicit, so the tiebreaker is whether the memory is a personal event or a general fact.

Prospective memory

Remembering to do something in the future, such as returning a book on Thursday. It fails constantly in daily life and makes a clean FRQ example.

Maintenance vs. elaborative rehearsal

Maintenance repeats the material to keep it active. Elaborative connects it to meaning and to other knowledge. Only the second one reliably builds long-term storage.

Encoding decides what retrieval can find (2.4, 2.6)

Levels of processing describes how encoding affects retention. Structural encoding focuses on appearance, phonemic encoding on sound, and semantic encoding on meaning, and memory lasts longer as processing moves in that order. Rereading notes keeps processing shallow and builds familiarity with the page, which is recognition rather than the recall a test requires.

Three encoding strategies are tested often and are useful for studying. **Chunking** groups items into meaningful units so the roughly seven-item limit applies to chunks rather than digits. **Mnemonic devices** attach new material to vivid cues, and the method of loci attaches it to places on a familiar route. **Spacing** spreads study across sessions, and distributed practice generally outperforms massed practice on delayed tests. In the serial position effect, early items benefit from extra rehearsal (primacy) and late items are still active at recall (recency), while middle items get neither advantage. Rotating study order keeps the same items from always falling in the middle.

Retrieval, forgetting, and memory going wrong (2.6, 2.7)

Recall produces an answer with few cues, as on an FRQ, while **recognition** identifies an answer among options, as on multiple choice. Retrieval is better when test cues match encoding conditions, which includes context-dependent and state-dependent effects and the encoding specificity principle. The **testing effect** is the finding that retrieval practice strengthens later retrieval more than additional study. Ebbinghaus showed forgetting is steep at first and then levels off, so early review is more useful than waiting until before the exam.

Encoding failure means information never entered long-term memory, and **storage decay** means the trace weakened over time. **Proactive interference** is earlier learning interfering with newer recall, and **retroactive interference** is newer learning interfering with older recall. Note which memory is blocked to tell them apart.

Memory is reconstructive rather than a replay. The **misinformation effect** is misleading information after an event altering recall, and **constructive memory** is the broader tendency to fill gaps from schemas, as in Loftus's eyewitness research. **Flashbulb memories** for emotional public events feel vivid but can still be inaccurate. Anterograde amnesia impairs forming new explicit memories after damage, often involving the hippocampus, while retrograde amnesia is loss of memories formed before the damage.

Check your understanding. Cover this page and state the difference between massed and distributed practice, give an example of each interference type, and explain why a confident eyewitness can still be wrong. Add any term you miss to your next flashcards.

Intelligence questions are really measurement questions (2.8)

Spearman proposed **g**, a general intelligence factor that underlies performance across cognitive tasks, identified through factor analysis of correlations among tests. Later theories split ability further. The Cattell-Horn-Carroll tradition separates **fluid intelligence**, reasoning and solving new problems, from **crystallized intelligence**, accumulated knowledge and vocabulary. Fluid performance tends to decline in later adulthood. Crystallized knowledge tends to hold or grow. A question describing an older adult who is slower on novel puzzles but excellent at crosswords is testing exactly that split.

Intelligence tests are also used for different purposes. An **aptitude test** is designed to predict future performance. An **achievement test** measures what has already been learned. Many exam questions about this topic do not focus on the purpose of a test but on whether the test is sound, which is evaluated using three properties.

Reliability

Consistency. A reliable test gives similar scores on retesting and across its own items. Reliability says nothing about whether the test measures the right thing.

Validity

Accuracy of purpose. Content validity asks whether the test samples the domain. Construct validity asks whether it measures the theoretical trait it claims to measure. A test can be reliable without being valid. A bathroom scale that always reads five pounds heavy is reliable and not valid.

Standardization and norms

A test is standardized when it is given and scored under uniform conditions, and norms come from a pretested representative sample. IQ scores are built on this, with a mean of 100 and most scores falling within about 15 points on either side.

Three additional findings are covered in this topic. The **Flynn effect** refers to the rise in average IQ scores across the twentieth century. Because this increase occurred too quickly to be explained by genetic change, it is generally attributed to environmental factors such as schooling and nutrition. **Stereotype threat** refers to the concern that awareness of a negative stereotype about one's group may lower performance in the area being tested. **Mindset** research distinguishes between a fixed mindset, in which intelligence is viewed as set at birth, and a growth mindset, in which intelligence is viewed as capable of developing through effort and strategy. The framework also includes emotional intelligence, which involves the ability to perceive, understand, and manage emotions in oneself and others.

For this course, focus on the definitions, the distinctions between types of intelligence, and the reasoning behind test measurement rather than on broader debates about the nature of intelligence.

Where students lose points

Errors in Unit 2 usually do not come from missing an entire topic. They more often involve two terms that sound similar, with a question written to test whether you can distinguish between them. The seven pairs below account for many of the most common errors in this unit.

THE TRAP	WHAT STUDENTS PICK	WHAT THE QUESTION ACTUALLY DESCRIBED
Top-down vs. bottom-up	Whichever half of the pair they saw last	Expectations and prior knowledge driving the reading is top-down. Stimulus features driving it is bottom-up.
Inattentional vs. change blindness	They swap them freely	Missing an object that was visible all along is inattentional. Missing a swap is change blindness.
Representativeness vs. availability	Availability, for any judgment question	Matching a prototype is representativeness. Ease of recalling examples is availability.
Mental set vs. functional fixedness	Functional fixedness, for any stuck problem	Stuck on an old strategy is mental set. Stuck on an object's usual use is functional fixedness.
Proactive vs. retroactive interference	Whichever term they studied most recently	Old blocks new is proactive. New blocks old is retroactive. Ask which memory is blocked.
Recall vs. recognition	Recall, for any hard question	Multiple choice is recognition. Short answer and FRQ are recall.
Reliability vs. validity	Reliable, as a synonym for good	Consistent scores are reliable. Measuring the right thing is valid, and a test can be one without the other.

When you read a practice question, look for the detail that distinguishes the two terms in the pair. In most questions, that detail appears in a single clause in the stem.

Those seven pairs are built into the Cognition deck in Rycal. Drill the pair that keeps tripping you instead of rereading the whole table.

Practice question 1

While proofreading his own essay, Daniel reads the sentence as correct and misses that the word the is printed twice in a row. His teacher, reading the same page cold, spots the error at once. Which concept best explains Daniel's miss?

- A. Bottom-up processing
- B. Top-down processing
- C. Retinal disparity
- D. Closure

Answer: B. Daniel's knowledge of what the sentence should say drove what he perceived, so the extra word never registered. That is top-down processing working against accuracy. Choice A describes the opposite direction, building meaning from the letters themselves, which is what the teacher's fresh reading came closer to doing. Choice C is a binocular depth cue and plays no role in reading text. Choice D is a Gestalt grouping principle about completing incomplete shapes, and the sentence was complete on the page. The error was in Daniel's expectations.

Practice question 2

A researcher develops a new reasoning test. Students who take it twice, two weeks apart, get nearly identical scores, and the test items correlate strongly with each other. The researcher concludes the test measures general intelligence. A reviewer objects that high scores mostly predict performance in one school subject and track years of schooling more than novel problem-solving. Which evaluation is most accurate?

- A. The test is reliable but its construct validity is in question
- B. The test is valid but not reliable
- C. The test lacks standardization because students took it twice
- D. The scores show a Flynn effect across the two administrations

Answer: A. Consistent scores across time and items demonstrate reliability. The reviewer's objection is about whether the test measures the trait it claims to measure, which is construct validity, and a test can be reliable without being valid. Choice B reverses the evidence. Choice C misuses standardization, which concerns uniform administration and norms, not retesting. Choice D names a population trend across generations, not stability across two weeks.

The explanations identify each incorrect choice and explain why it does not fit the scenario. If you missed one, rate that card Still Learning in the Cognition deck in Rycal and drill it spaced over the next few days.

Eight questions to answer without looking

Answer each question out loud or in writing before you check your notes. Looking at the answer first turns the exercise into rereading, which involves the shallower processing described earlier in this guide. If writing helps, do a quick Brain Dump in Rycal first and then check what you left out.

1. A student misses a gorilla costume crossing the stage during a counting task. Name the phenomenon and state why it is not a memory failure.
2. Why does reading a handwritten shopping list go faster than sounding out each word, and which processing direction is that?
3. A voter judges a candidate likely to be corrupt because news stories about corruption come to mind easily. Which heuristic is that, and how does it differ from representativeness?
4. Give one example each of mental set and functional fixedness, using the same box of thumbtacks.
5. Your old locker combination keeps displacing your new one. Which interference is that, and which memory is being blocked?
6. Explain why cramming the night before loses to the same hours spread across a week, using the spacing effect and the forgetting curve.
7. An older adult is slower on brand-new puzzles but beats everyone at trivia night. Name the two intelligences and say which is doing which job.
8. A scale always reads exactly four pounds heavy. Is it reliable, valid, both, or neither? Defend your answer in one sentence.

Anything you cannot say out loud without looking belongs in the Cognition deck. In Rycal, mark that card Still Learning and it will return sooner while the cards you know move farther apart.

Study Unit 2 in Rycal

Start with what you missed in this guide. Turn every missed item into a flashcard and drill those cards spaced over several days rather than in one sitting.

1. **Flashcards** - Use the Cognition deck under AP Psychology. It covers the terms in this guide. Rate each card Still Learning or Know and the spaced repetition schedule will bring the weak ones back sooner.
2. **Practice questions** - Work the Unit 2 practice questions in Rycal. They target the same traps named in this guide, including top-down versus bottom-up, the two interference types, and reliability versus validity.
3. **Test Planner** - Add your exam date to space the remaining review across the days you have left.

Open the Cognition deck at rycal.web.app/ap-psychology-flashcards.

Questions students ask about Unit 2

How much of the exam is Unit 2?

The framework weights cognition at 15 to 25 percent of the multiple-choice questions, the same range as the other units. Memory accounts for a substantial portion of that range, perception and thinking appear regularly, and intelligence is usually tested through questions about measurement.

What is the difference between a heuristic and an algorithm?

An algorithm guarantees a correct answer if you complete its steps. A heuristic is a faster shortcut that is usually correct but can lead to errors in specific situations. Most decision questions describe a heuristic.

Why does rereading feel like it works?

Rereading mainly builds recognition of the page. A test usually requires recall of the ideas in a new scenario. That difference helps explain why students can feel prepared and score lower than expected. Self-testing practices the recall the test requires.

Can a test be reliable without being valid?

Yes. A scale that always reads four pounds heavy is consistent and wrong. Reliability is necessary for a good test but it is not sufficient. Validity asks whether the test measures what it claims to measure.

About this guide. Written for Rycal and aligned to the College Board AP Psychology course framework, Unit 2, topics 2.1-2.8. All questions and explanations are original Rycal writing. Rycal is independent and is not affiliated with or endorsed by the College Board.

Where to go next. Turn every missed item above into flashcards and drill them spaced out over several days rather than in one sitting. In Rycal, open the Cognition deck under AP Psychology. The deck covers the terms in this guide, and its practice questions target the same traps named here. If you have a test date, add it in

Key terms for this unit

Accommodation (schemas), Achievement tests, Algorithm, Alzheimer's disease, Anterograde amnesia, Apparent movement, Aptitude tests, Assimilation (schemas), Attention, Autobiographical memory, Automatic processing, Availability heuristic, Binocular depth cues, Bottom-up processing, Central executive, Change blindness, Chronological age, Chunking, Closure, Cocktail party effect, Concept, Construct validity, Constructive memory, Context-dependent memory, Convergence, Convergent thinking, Creativity, Distributed practice, Divergent thinking, Echoic memory, Effortful processing, Elaborative rehearsal, Encoding, Encoding failure, Episodic memory, Executive functions, Explicit memory, External factors in perception, Figure-ground, Fixed mindset, Flynn Effect, Forgetting curve, Framing, Functional fixedness, Gambler's fallacy, General intelligence (g), Gestalt psychology, Growth mindset, Heuristic, Highly superior autobiographical memory, Historical misuse of intelligence testing, Iconic memory, Identifying students for educational services, Imagination inflation, Implicit memory, Infantile amnesia, Intelligence quotient (IQ), Interposition, Levels of processing model, Linear perspective, Long-term memory, Long-term potentiation, Maintenance rehearsal, Massed practice, Medulla, Memory consolidation, Mental age, Mental set, Metacognition, Method of loci, Misinformation effect, Mnemonic devices, Monocular depth cues, Mood-congruent memory, Multi-store model, Multiple abilities view of intelligence, Perception, Perceptual constancy, Perceptual set, Phonemic encoding, Phonological loop, Predictive validity, Primacy effect, Priming, Proactive interference, Procedural memory, Prospective memory, Prototype, Proximity, Psychometric principles, Recall, Recency effect, Recognition, Relative clarity, Relative size, Reliability, Representativeness heuristic, Repression, Retinal disparity, Retrieval practice, Retroactive interference, Retrograde amnesia, Schema, Semantic encoding, Semantic memory, Sensory memory, Serial position effect, Short-term memory, Similarity, Socio-culturally responsive assessments, Sociocultural biases in intelligence testing, Source amnesia, Spacing effect, Split-half reliability, Standardization, State-dependent memory, Stereotype lift, Stereotype threat, Structural encoding, Sunk-cost fallacy, Test-retest reliability, Testing effect, Texture gradient, Tip-of-the-tongue phenomenon, Top-down processing, Selective Attention, Inattentional Blindness, Grouping, Depth Perception, Color Constancy, Perceptual Adaptation, Stroboscopic Movement, Phi Phenomenon, Autokinetic Effect, Cognition, Nudge, Insight, Fixation, Intuition, Overconfidence, Memory, Neurogenesis, Shallow Processing, Deep Processing, Storing, Retrieval, Flashbulb Memory, Relearning, Retrieval Cues, Encoding Specificity Principle, Interleaving, Reconsolidation, Deja Vu, Intelligence, Cattell-Horn-Carroll Theory (CHC), Savant Syndrome, Grit, Emotional Intelligence, Stanford-Binet, Wechsler Adult Intelligence Scale (WAIS), Psychometrics, Normal Curve, Content Validity, Cohort, Validity, Visuospatial sketchpad, Within-group vs. between-group variation in IQ scores, Working memory model.