Course notes

GRE Subject Test · GRE Psychology

Gre Psychology

Computer-delivered undergraduate GRE Psychology

Approximately 144 multiple-choice items in 120 minutes. Biological, cognitive, social, developmental, clinical, and measurement/methodology/other content. Academic clinical concepts do not replace professional diagnosis.

Official scope: https://www.ets.org/gre/test-takers/subject-tests/about/content-structure.html

I · Biological psychology

- Sensation concerns reception of stimulation; perception concerns interpretation. They interact but are not interchangeable.
- Signal detection separates sensitivity from the criterion for saying yes. Expectations can change the response criterion.
- Neurons communicate through electrical signals and synapses. A brain region's involvement does not establish that it acts alone.
- Lesion and imaging studies give different evidence. Consider confounds and the limits of inferring causes from associations.

■ Checked example

A person expecting an alarm reports more faint sounds as alarms. Hits may rise, but false alarms may also rise. This can reflect a more liberal response criterion rather than better sensory sensitivity.

■ Common error

A brain image showing activity during a task is not proof that the region alone causes the behaviour.

II · Cognition, language and learning

- Classical conditioning associates stimuli; operant conditioning changes behaviour through consequences.
- Negative reinforcement removes an unpleasant condition and increases behaviour. It is not punishment.
- Working memory supports current processing. Long-term memory includes explicit and implicit forms.

- Language uses phonemes for sound contrasts and morphemes for meaning units. Problem solving can be limited by fixation or biased heuristics.

■ Checked example

A seat-belt alarm stops when the belt is fastened. Removing the alarm makes fastening more likely: negative reinforcement. If an added fine reduces unsafe driving, that is positive punishment. Positive and negative mean adding and removing, not good and bad.

■ Common error

Recognition performance cannot be treated as identical to unaided recall performance.

III · Social psychology

- Attribution concerns explanations for behaviour. Situational and dispositional causes should be distinguished.
- Conformity concerns group pressure; obedience concerns an authority's instruction. Both require a clear social context.
- Attitude and behaviour links depend on measurement and situation. A stated intention is not identical to observed action.
- Group research must consider social norms, selection and ethical constraints before generalising its findings.

■ Checked example

A participant agrees with a group's visibly wrong answer. If the person privately doubts it but complies to avoid rejection, normative influence is a plausible explanation. Accepting the group as a source of information is informational influence.

■ Common error

Do not infer a person's stable trait from a single constrained action.

IV · Developmental psychology

- Development covers the lifespan and multiple domains, not just childhood milestones.
- Cross-sectional studies compare ages at one time; longitudinal studies follow people over time.
- Cohort effects can confound age comparisons. Longitudinal studies face attrition and repeated-testing effects.
- Theories offer different accounts of change. Apply their specific mechanisms rather than treating a stage label as an explanation.

■ Checked example

Comparing 20-year-olds and 70-year-olds on computer use cannot isolate age: they had different exposure opportunities. Following one group helps examine change but may lose participants unevenly, creating attrition bias.

■ Common error

Average developmental patterns do not imply identical timing or outcomes for every person.

V · Personality, clinical and abnormal psychology

- Trait theories describe relatively stable dimensions; other personality theories emphasise learning, cognition or internal dynamics.
- Clinical classification uses patterns, impairment, context and differential explanations. A symptom alone is insufficient.
- Therapies differ in proposed mechanisms. Cognitive approaches examine thoughts; behavioural approaches change learning contingencies.
- Treatment studies need suitable comparison groups and defined outcomes. These lessons teach academic concepts, not self-diagnosis or treatment advice.

■ Checked example

A therapy group improves after six weeks. Without a comparison, the change may reflect therapy, spontaneous improvement, expectancy or regression toward the mean. Random allocation and an appropriate comparison can improve causal evidence.

■ Common error

Do not diagnose yourself or classmates from a multiple-choice description. Actual assessment belongs to qualified clinicians.

VI · Measurement, methods, statistics and history

- Reliability concerns consistency; validity concerns evidence supporting a particular interpretation or use.
- Operational definitions specify how a construct is measured. A questionnaire label does not establish construct validity.
- Random assignment improves comparisons; random sampling supports population generalisation. Ethics constrains both design and interpretation.
- A p-value is a probability of data at least as incompatible under the null model, not the probability that the null is true. History questions distinguish explanatory schools and their methods.

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■ Checked example

A memory test yields similar scores on repeated administrations but mostly measures reading skill. It may show test–retest reliability while lacking evidence for its intended memory interpretation. Establishing validity requires more than repeated agreement.

■ Common error

Statistical significance alone does not tell you effect size, practical value or absence of design bias.

VII · Historical perspectives and psychometric interpretation

- Structuralism analysed conscious experience; functionalism asked how mental activity serves adaptation. Behaviourism emphasised observable learning; Gestalt psychology stressed organised perception. These are historical emphases, not interchangeable labels.
- Psychoanalytic accounts emphasise unconscious conflict, humanistic accounts agency and growth, and cognitive accounts information processing. Compare the explanatory mechanism rather than matching every theory to a single familiar name.
- Reliability concerns consistency across measurements. Validity concerns evidence for a proposed interpretation and use. A high reliability coefficient cannot prove that a test measures the intended construct fairly.
- Standardisation supplies consistent administration and a relevant reference sample. Norm-referenced standing differs from criterion-referenced mastery. Predictive value depends on base rates as well as sensitivity and specificity.

■ Checked example

In 1,000 people, suppose 10 have a target condition. A screening tool detects 9 of those 10, but falsely flags 99 of the other 990. Among 108 positive screens, only $9/108 \approx 8.3\%$ are true positives. This is a hypothetical methods example, not a diagnostic recommendation.

■ Common error

Do not equate sensitivity with the probability that a positive result is correct, and do not use a classroom score to diagnose a disorder.

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CL.1 · Diagnostic systems and disorder classification

- The recorded framework is DSM-5-TR. Clinical classification describes patterns; a category does not establish the cause of a presentation. Historical ETS items must be interpreted against their recorded source version.
- Symptoms, duration, clinically significant distress or impairment, context and exclusions must be considered together. A short duration does not by itself establish acute stress disorder or any other diagnosis.
- The diathesis-stress model examines how vulnerability and environmental stress jointly affect risk. Neither a family history nor a later event establishes an inevitable outcome or a universal necessity/sufficiency rule.
- Common educational distinctions include added experiences versus reduced functions in symptom descriptions, and episodic presentations versus enduring patterns. Full current criteria require an authenticated manual; the available GRE practice book is not that manual.

■ Checked example

A fictional vignette supplies a recent adverse event and two symptoms but omits impairment, exclusions and a full assessment. What conclusion is justified? The vignette identifies relevant evidence and missing information. It cannot establish a diagnosis. A duration threshold alone cannot turn a short account into an alternative disorder. The correct educational response is to name the missing criterion domains and source/version, not supply personal advice.

■ Common error

Do not infer a diagnosis from duration or a few symptoms, or offer personal treatment advice.

CL.2 · Treatment models and outcome evidence

- Each therapy family proposes a mechanism. Psychodynamic work targets unconscious conflict and early relationships, using transference; object-relations variants emphasise early relationships in particular. Behavioural treatment applies learning principles: systematic desensitisation traditionally pairs a graded fear hierarchy with relaxation (counterconditioning), while exposure approaches need not use relaxation pairing. Cognitive-behavioural therapy identifies and tests distorted thoughts and adds behavioural activation. Person-centred work offers empathy, unconditional positive regard and congruence; Gestalt work stresses the here and now. Biological treatment includes medication and, for severe depression, electroconvulsive therapy.
- Match technique to mechanism and presentation: specific phobia points to graduated exposure; obsessive-compulsive disorder to exposure with response prevention; depression to cognitive restructuring plus activity scheduling. A therapist rooted in

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object relations will emphasise early life relationships, not medication or cognitive distortion lists.

- Outcome claims need controls because of spontaneous remission and regression to the mean: people seek help at their worst and improve anyway. A randomised controlled trial with a waitlist or placebo comparison separates treatment gain from natural course. Efficacy is performance under controlled conditions; effectiveness is performance in ordinary practice. Meta-analysis pools trials for a more stable estimate.
- When bona fide therapies show comparable mean outcomes, the common-factors hypothesis credits shared ingredients such as the working alliance, expectancy and empathy rather than branded techniques. Comparable means do not prove identical mechanisms, and a single trial cannot settle the question either way.

Checked example

A therapist rooted in object relations theory emphasises early life relationships. A phobia treated by a relaxation-paired hierarchy is counterconditioning. A treated group improving from pre-test to post-test shows change, not efficacy: without a control, regression to the mean and spontaneous remission remain open.

Common error

Inferring causation from a before-and-after gain without a control, or treating comparable means as proof of identical mechanisms.

MM.1 · Psychometrics and test construction

- Reliability is consistency, and its type is named by the design that produced it: the same test twice gives test-retest reliability; two similar forms give alternate-forms reliability; consistency within one sitting (split-half, Cronbach alpha) is internal consistency; agreement between scorers is inter-rater reliability. The Spearman-Brown formula r_full=2r/(1+r) rescales a half-test correlation to full test length: r=.80 becomes about .89.
- Validity is evidence for the proposed interpretation, not of the test itself: content validity asks whether items cover the domain; criterion validity relates scores to an outcome, concurrently or predictively; construct validity assembles convergent and discriminant evidence that the score tracks the intended trait. Reliability caps validity but never establishes it: a consistent scale can systematically measure something else.
- Standard scores re-express raw scores against a norm group: z=(X−mean)/SD, T=50+10z, and Wechsler deviation IQ=100+15z. A z of +2 gives IQ 130 and about the 98th percentile. The standard error of measurement SEM=SD×sqrt(1−r) converts reliability into a score band: SD=15 with r=.91 gives SEM=15×sqrt(.09)=4.5.

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- Item analysis checks each item: difficulty p is the proportion answering correctly, and discrimination is the item-total correlation. Items that nearly everyone or no one answers correctly carry little information; negative discrimination flags a likely miskeyed or misleading item.

■ Checked example

Two similar vocabulary tests given a week apart with r=.90 show alternate-forms reliability, not test-retest, because the form changed. With SD=15 and reliability .91, SEM=4.5 points. A z of +2 corresponds to IQ 130. A split-half correlation of .80 corrects to $2\times.80/1.80\approx.89$ at full length.

■ Common error

Calling a two-different-forms correlation test-retest reliability, or citing high reliability as if it were validity evidence.

MM.2 · Research designs and statistical interpretation

- A true experiment manipulates an independent variable with random assignment of participants to conditions; between-subjects designs give different people to each condition, within-subjects designs measure the same people in every condition and need counterbalancing. A quasi-experiment lacks full assignment, and a correlational study does not manipulate an independent variable. Correlation alone does not establish causation or temporal order. Random assignment supports internal validity (causal inference); random sampling supports external validity (generalisability). They answer different questions.
- Match analysis to design, measurement scale and assumptions. Two independent quantitative groups may suit an independent-samples t-test; paired data require a paired analysis. Factorial designs often use analysis of variance; categorical counts may suit a chi-square test when expected-count assumptions hold. Correlation or regression examines specified associations; neither alone establishes causation.
- A main effect averages one factor across the other factor. An interaction means one effect depends on the other factor. Nonparallel sample means suggest an interaction pattern, but variability and the design are needed for population inference. Interactions can exist when averaged main effects cancel; lack of significance is not proof of no effect.
- Mean age 26 with most students 25 or younger is compatible with right skew, but does not uniquely determine distribution shape. Statistical significance is not effect size. A p-value is a probability of results at least as extreme under the specified null model and assumptions, not the probability the null is true. Type I and Type II errors depend on design and decision thresholds.

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■ Checked example

Fictional mean scores are: task A, novices 4 and experts 8; task B, novices 8 and experts 4. Compute marginal means and describe the pattern. Novice marginal mean=(4+8)/2=6; expert marginal mean=(8+4)/2=6. Task A marginal mean=(4+8)/2=6; task B marginal mean=(8+4)/2=6. The task contrast reverses by expertise, an interaction pattern despite equal marginal means. Means alone do not establish a population interaction; variability, design and inference are needed.

■ Common error

Drawing a causal conclusion from a correlational design, or reporting a significant interaction as if it were a main effect of one factor.

SP.1 · Sensation, perception and psychophysics

- Psychophysics relates physical intensity to experience. An absolute threshold is a stimulus level meeting a specified detection criterion under specified conditions, often 50% detection; a difference threshold is a detectable change under a stated criterion. Weber's law states that the difference threshold is a constant fraction of the baseline: $\Delta I/I=k$. With k=.02, a 100 g weight needs a 2 g change, while 200 g needs 4 g. Fechner proposed that perceived intensity grows logarithmically with physical intensity.
- Real detection is noisy, so signal detection theory separates sensitivity from bias. Presenting signal or noise on each trial gives four outcomes: hits, misses, false alarms and correct rejections. Sensitivity d' measures how separated the signal and noise distributions are; the criterion measures the observer's willingness to say yes. A payoff change can move the criterion without changing d', so hit rate alone is not sensitivity.
- Sensation begins with transduction: receptors convert physical energy into neural signals, as photoreceptors convert light and hair cells convert sound pressure. Sensory adaptation reduces response to a constant stimulus. Dark adaptation is the recovering sensitivity of the visual system in low light.
- Perception organises input rather than copying it. Gestalt principles group by proximity, similarity, closure and good continuation. Bottom-up processing builds percepts from features; top-down processing applies context and expectation. Categorical perception treats continuous acoustic variation as discrete phonemes: within a category, differences are hard to hear even when physically present.

■ Checked example

With Weber fraction .02, detecting a change from 50 g needs 1 g, and from 500 g needs 10 g. A radiologist who says yes more often after a pay-per-hit scheme shifts criterion, not d'. A listener who cannot distinguish two within-category speech sounds shows categorical perception of a physically continuous dimension.

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■ **Common error**

Treating the difference threshold as a fixed amount rather than a fraction of the baseline, or reading a higher hit rate as better sensitivity when the observer simply says yes more.

NE.1 · Neurons, synapses and brain systems

- The action potential begins at the axon hillock, where graded inputs sum; once the threshold is reached the neuron fires a complete spike (the all-or-none principle), and during the absolute refractory period it cannot fire again. Stimulus intensity is coded by firing rate and by how many neurons fire, not by spike size. Myelin insulates the axon and speeds conduction by saltatory conduction between the nodes of Ranvier; demyelinating disease slows or blocks conduction.
- At the synapse, the arriving spike opens calcium channels, vesicles release neurotransmitter into the cleft, and receptors on the postsynaptic cell convert binding into a new graded potential. Reuptake and enzymatic breakdown clear the transmitter. A drug can be an agonist (mimicking or enhancing a transmitter) or an antagonist (blocking receptors); SSRIs block serotonin reuptake, leaving more in the cleft.
- Structure-function anchors: the amygdala supports emotion and fear learning; the hippocampus is needed to form new episodic memories; the hypothalamus regulates drives and homeostasis; the cerebellum coordinates movement; Broca's area supports speech production and Wernicke's area comprehension; the prefrontal cortex supports planning and control. Localisation is real but partial: most behaviours involve distributed networks.
- Dopamine illustrates specificity: it supports movement and reward, its loss produces Parkinson's disease, and excessive dopaminergic signalling is linked to positive symptoms of schizophrenia, which many antipsychotics treat by blocking D2 receptors. One transmitter serves many systems, so a drug's behavioural effect depends on the pathway, not the molecule alone.

■ **Checked example**

A spike is triggered at the axon hillock once summed inputs cross threshold; after firing, the absolute refractory period enforces a pause. Blocking serotonin reuptake raises synaptic serotonin, which is the SSRI mechanism. Loss of dopaminergic neurons impairs movement in Parkinson's disease.

■ **Common error**

Describing a stronger stimulus as producing a bigger spike, or naming a single brain centre as the whole basis of a complex behaviour.

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DV.1 · Developmental theories and milestones

- Piaget's stages are defined by what a child can do. Sensorimotor (birth to about 2): object permanence. Preoperational (about 2 to 7): symbolic play but egocentrism and failure of conservation. Concrete operational (about 7 to 11): conservation and reversible operations on concrete material. Formal operational (about 11 up): hypothetico-deductive reasoning, as in the pendulum task, where the solver holds one factor constant while varying another. Ages are approximate; the reasoning profile defines the stage.
- Kohlberg ordered moral reasoning into preconventional (consequences to self), conventional (approval and rules) and postconventional (principles) levels. Erikson framed eight lifespan psychosocial crises, from trust versus mistrust in infancy to integrity versus despair in late adulthood; identity versus role confusion belongs to adolescence. Stage theories describe common sequences, not fixed timetables.
- Attachment research uses the strange situation: secure infants use the caregiver as a base and are comforted at reunion; avoidant infants keep distance; resistant (ambivalent) infants cling yet are not easily comforted. Caregiver sensitivity predicts the pattern, and early patterns relate to later relationships without determining them.
- Theory of mind is understanding that others hold beliefs, including false ones. The false-belief task is its standard test: a child who expects a searcher to look where the object really is, rather than where the searcher saw it, has not yet passed. Intentional lying presupposes modelling what another person believes, so deceptive lying marks a change in mental representation.

■ Checked example

A child who solves the pendulum problem by holding X constant while varying Y shows formal-operational reasoning. Conserving liquid volume across containers marks concrete operations. An infant who is easily comforted at reunion shows a secure pattern. Expecting a searcher to look where the object really is fails the false-belief task.

■ Common error

Assigning a stage by age alone, or treating a developmental sequence as a fixed timetable; the reasoning profile, not the birthday, defines the stage.

HT.1 · Theorists, schools and their claims

- Psychology's laboratories began in the 1870s: Wilhelm Wundt at Leipzig (1879) and William James's Harvard laboratory work. Wundt's student Titchener carried structuralism, analysing experience into elements by introspection; James's functionalism instead asked what mental processes are for, shaped by evolution. Gestalt psychologists (Wertheimer, Köhler, Koffka) rejected element analysis, arguing that

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organised wholes precede parts in perception.

- Freud's psychoanalysis centred on unconscious conflict and early experience, with defence mechanisms and stages of psychosexual development; its claims are debated as science but shaped clinical practice. Watson's 1913 behaviourism rejected introspection for observable behaviour, and Skinner's radical behaviourism explained action by operant consequences. Horney analysed coping as moving toward, away from or against people.
- The humanistic third force (Maslow's hierarchy of needs, Rogers's person-centred approach) stressed growth and self-actualisation against both psychoanalysis and behaviourism. The cognitive revolution of the 1950s restored mind as a lawful object: Miller's working-memory limits, Neisser's cognitive synthesis, and Chomsky's 1959 review arguing that Skinner's verbal-behaviour account cannot explain language acquisition.
- Later traditions built on these: Bandura's social learning (the Bobo doll studies) added observation and modelling to conditioning; Beck's cognitive therapy treats distorted thinking in depression; Eysenck described personality on broad dimensions such as extraversion and neuroticism. Match each name to a claim and method, not merely to a famous phrase.

■ Checked example

Wundt's Leipzig laboratory and James's Harvard work mark the 1870s founding; Titchener turned introspection into structuralism while James asked functional questions. Chomsky's review of Verbal Behavior is a landmark of the cognitive turn against Skinner. A therapist targeting distorted automatic thoughts works in Beck's cognitive tradition.

■ Common error

Crediting one founder with founding alone, or treating psychoanalytic claims and tested cognitive findings as the same kind of evidence.

LR.1 · Conditioning, reinforcement and observational learning

- Classical conditioning pairs a neutral stimulus with an unconditioned stimulus until the neutral stimulus (now conditioned) evokes a conditioned response: bell then food gives bell-evoked salivation. Key phenomena: acquisition, extinction when the CS appears without the US, spontaneous recovery after a pause, generalisation to similar stimuli and discrimination between them. The CS predicts the US; timing and contingency matter.
- Operant conditioning changes voluntary behaviour by its consequences. Reinforcement INCREASES behaviour: positive adds something wanted, negative removes something aversive. Punishment DECREASES behaviour: positive adds something aversive, negative removes something wanted. Negative reinforcement is not

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punishment: both escape and avoidance strengthen the behaviour that ends or prevents the aversive event.

- Reinforcement schedules shape response patterns. Fixed-ratio schedules give high rates with a post-reinforcement pause; variable-ratio schedules give the highest, steadiest rates and resist extinction (gambling). Fixed-interval schedules give scalloped responding that rises near the interval end; variable-interval schedules give steady moderate rates. Ratio schedules count responses; interval schedules count time.
- Observational learning needs attention to the model, retention of what was seen, the ability to reproduce it, and motivation; vicarious reinforcement (seeing the model rewarded) raises imitation. Bandura's Bobo doll studies showed children imitate filmed aggression. Modelling extends learning beyond direct experience.

■ Checked example

A tone repeatedly followed by food comes to evoke salivation; presenting the tone without food extinguishes it, yet the response can briefly return after a rest (spontaneous recovery). A slot machine is a variable-ratio schedule: rapid, steady, extinction-resistant play. Taking an aspirin to end a headache is negative reinforcement; a fine for late work is negative punishment.

■ Common error

Calling negative reinforcement punishment, or treating any unpredictable reward as variable-ratio; interval schedules pay the first response AFTER the interval.

ME.1 · Memory systems, processes and forgetting

- The modal model orders stores by duration. Sensory memory holds a brief, nearly complete trace – iconic for vision, echoic for hearing – and a mask within 200–300 ms destroys it. Short-term or working memory holds a few chunks for seconds; Miller's classic estimate is 7 ± 2 chunks, and rehearsal keeps material active. Long-term memory is durable and effectively unlimited.
- Working memory is more than a short store: Baddeley's model has a central executive with a phonological loop for speech-like material and a visuospatial sketchpad for images. Chunking recodes items into familiar units, expanding effective capacity without expanding the store.
- Long-term memory divides by content and awareness. Episodic memory is personal events; semantic memory is facts and knowledge; procedural memory is skills. Implicit memory shows in performance without deliberate recall (priming, skills); explicit memory is deliberate recall or recognition. A person can show priming for material they cannot consciously recollect.
- Forgetting has identifiable mechanisms. Proactive interference is old learning disrupting new; retroactive interference is new learning disrupting old. Retrieval

failure follows encoding specificity: cues matching the encoding context restore recall. The serial position curve (primacy and recency) separates long-term from immediate-store contributions.

Checked example

A masked letter array is lost within 300 ms – sensory memory. Remembering a phone number by 3-4 digit chunks uses chunking in working memory. Recognising a face without recalling the meeting is implicit memory. After learning French then Spanish, French vocabulary intrudes into Spanish recall: proactive interference.

Common error

Treating working memory as a single box, or calling every memory failure decay; interference and cue-dependent retrieval failure account for most exam cases.

LG.1 · Language structure, perception and acquisition

- Language is hierarchical. Phonemes are the smallest sound units that distinguish meaning (/b/ versus /p/); morphemes are the smallest meaning-bearing units (un-happy-ness has three); syntax governs how words combine into phrases and sentences; semantics concerns meaning. A sentence can be grammatical yet meaningless – syntax and semantics are separable.
- Speech perception is categorical: continuous acoustic variation is heard as discrete phonemes, so a sound between /b/ and /p/ is reported as one or the other. Listeners segment a continuous stream using transitional probabilities and knowledge, not audible gaps between words.
- Reading links print to sound and meaning. Skilled readers use both a grapheme-to-sound route (sounding out) and a direct whole-word route for familiar words; dyslexia research separates phonological decoding deficits from surface patterns. Eye-movement studies show reading is a series of fixations and saccades, not smooth gliding.
- Bilingualism research separates language proficiency from general intelligence: balanced bilinguals show executive-control practice effects, while subtractive schooling can harm both languages. Second-language learning declines with age of onset, especially for pronunciation and grammar, without a single sharp critical cut-off.

Checked example

Un-happy-ness is three morphemes but the spoken form has more phonemes than syllables. A sound midway between /b/ and /p/ is heard as clearly one or the other – categorical perception. Colourless green ideas sleep furiously is grammatical but meaningless, separating syntax from semantics.

■ **Common error**

Counting morphemes by letters or syllables, or treating word boundaries in speech as physically present; segmentation is inferred by the listener.

TH.1 · Thinking, problem solving and intelligence

- Concepts group instances; natural concepts have fuzzy boundaries organised around prototypes, so a robin is a "better" bird than a penguin and is verified faster. Schemas are organised knowledge structures about domains; scripts are schemas for event sequences (the restaurant script). Schemas guide encoding and also distort recall toward the expected.
- An algorithm guarantees a solution by exhaustive rule; heuristics trade certainty for speed. Availability estimates frequency by ease of recall, so vivid events are overestimated. Representativeness judges by similarity to a prototype and neglects base rates. Anchoring drags estimates toward an initial number. Framing changes choices between logically equivalent descriptions, and confirmation bias seeks only supporting evidence.
- Problem solving fails in characteristic ways: functional fixedness (objects only in usual roles), mental set (old solutions to new problems), and missing insight restructuring. Means-end analysis reduces the difference to the goal; working backward suits problems with a clear goal state.
- Intelligence theories differ on structure: Spearman's general factor g, Cattell's fluid versus crystallised abilities, Gardner's multiple intelligences, Sternberg's triarchic analysis. Test interpretation follows the psychometrics of earlier units: scores are reliable for prediction within their validation samples, but a score measures performance on the test, not a fixed essence.

■ **Checked example**

Estimating plane crashes as commoner than car deaths after news coverage is the availability heuristic. Judging a quiet bookish stranger more likely a librarian than a farmer, despite far more farmers, is representativeness neglecting base rates. Using a candle only as a candle, not as part of a shelf, is functional fixedness.

■ **Common error**

Calling a heuristic an error in itself; heuristics are efficient defaults whose costs are predictable. Do not equate a test score with a fixed measure of worth or potential.

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SO.1 · Social cognition, attribution and social influence

- Attribution assigns causes to behaviour: internal (dispositional) or external (situational). The fundamental attribution error over-uses dispositional explanations for others, and the actor-observer asymmetry reverses this for ourselves. Correspondent inference asks when an act reveals a trait: freely chosen, unexpected or low-consensus acts are the most informative.
- Influence comes in two kinds: normative influence is conforming to be accepted; informational influence is accepting others' behaviour as evidence about reality. Asch's line studies showed conformity to a unanimous majority on unambiguous judgements; Milgram's obedience studies showed destructive compliance with an authority. Conformity falls sharply with one dissenting partner.
- Cognitive dissonance is the tension from holding inconsistent cognitions, reduced by changing attitudes or justifications; with insufficient external justification, people internalise the behaviour. Persuasion follows the elaboration likelihood model: the central route (arguments) produces durable change when audiences can and will think; the peripheral route (cues, attractiveness) is fragile.
- Self-evaluation processes include self-affirmation (restoring worth in an unaffected domain after a threat), self-verification (seeking confirming feedback), self-monitoring (adjusting self-presentation) and the self-serving bias (success internal, failure external). Excitation transfer lets residual arousal from one event intensify a later emotional reaction.

■ Checked example

Screaming at a friend after a parking ticket is excitation transfer: residual arousal intensifies the later anger. Reminding yourself of a strength after a comparison threat is self-affirmation. Agreeing with a unanimous group on an obvious line length is normative conformity. A vague appeal working only when the audience is distracted is peripheral-route persuasion.

■ Common error

Do not merge conformity and obedience (peer pressure versus authority), or call every dispositional inference an error; the error is neglecting the situation, not using traits at all.

SO.2 · Groups, relationships and intergroup processes

- Groups change performance. Social facilitation: the presence of others strengthens dominant responses, helping well-learned tasks and hurting novel ones. Social loafing: effort falls when individual contributions are unidentifiable. Groupthink: cohesive groups under pressure suppress dissent and reach poor decisions; deindividuation: anonymity in a crowd lowers self-restraint.
- Attraction is predicted first by propinquity – physical or functional proximity, as in

making friends on the same dorm floor – then similarity and reciprocal liking; mere exposure breeds familiarity-based liking. Social exchange theory reads relationships as outcomes minus costs against a comparison level; interdependence analyses use each partner's payoff structure.

- Separate the intergroup trio: stereotypes are beliefs about groups, prejudice is evaluative affect, discrimination is behaviour. The minimal-group paradigm shows in-group favouritism from arbitrary assignment alone; realistic conflict theory ties hostility to competition over resources; the contact hypothesis reduces prejudice under equal status, common goals and cooperative contact, not mere exposure.
- The bystander effect: help falls as witnesses increase, through diffusion of responsibility and pluralistic ignorance (each reads others' calm as no emergency). Aggression research links frustration to aggression and shows how residual arousal (excitation transfer) can escalate conflict; altruism is helped by clear identification of a single victim.

■ Checked example

Friends cluster on the same dorm floor – propinquity. A tug-of-war team slacks when pulls are pooled – social loafing under unidentifiable contributions. Arbitrary badge colours producing in-group preference is the minimal-group effect. Nobody calling for help in a crowded plaza is diffusion of responsibility.

■ Common error

Writing stereotype, prejudice and discrimination as synonyms, or promising that any contact fixes prejudice; contact works under conditions, not by default.

AT.1 · Attention limits and non-associative learning

- Attention is limited capacity. Early-selection accounts filter by physical features, late-selection accounts filter after meaning, and multimode theory (Johnston and Heinz) lets the selection point flex with task demands. Divided attention fails when combined demands exceed capacity: a hands-free call still slows driving because the bottleneck is central, not manual.
- Load theory separates perceptual load from working-memory load: high perceptual load in the main task shuts out distractors, while high working-memory load invites them. Predictions follow the load, not the slogan that multitasking is always impossible.
- Habituation is non-associative learning: repeated presentation of a stimulus weakens the response, and a changed stimulus restores it (dishabituation). No pairing with another stimulus is involved, which separates it from classical conditioning. A commuter who stops hearing a scheduled train has habituated; the response returns if the train schedule changes.

- Habituation is exploited as a measure: infants look longer at novel stimuli, so looking-time recovery after habituation indexes discrimination. Extinction in conditioning is different: there a learned association is withdrawn, not a repeated stimulus.

■ Checked example

A driver on a hands-free call brakes later because central capacity is shared, not because of occupied hands. City residents stop noticing constant traffic noise (habituation), but notice immediately when it stops or changes (dishabituation). An infant who looks longer at a changed display demonstrates discrimination through looking-time recovery.

■ Common error

Calling habituation a form of conditioning, or claiming attention always fails under any dual task; the cost depends on load and the selection point.

EX.1 · Evolutionary and comparative perspectives

- Kin selection explains helping by inclusive fitness: a gene spreads by aiding relatives who share it. Hamilton's rule says helping pays when rB>C – benefit to the recipient weighted by relatedness exceeds cost to the helper. With benefits and costs held equal, closer relatedness makes the inequality more likely to hold: compare siblings (r=.5) with first cousins (r=.125). The rule predicts direction and rough ordering, not exact human behaviour.
- Ethology studies species-typical behaviour. A fixed action pattern is an invariant sequence released by a specific sign stimulus and run to completion, as in classic egg-retrieval or mating displays. Because it is triggered rather than assembled, a fixed action pattern can be hijacked by supernormal stimuli – models with exaggerated features.
- Evolutionary explanations ask about function: how a behaviour raised reproductive success in ancestral environments. They compete or combine with learning accounts; prepared learning (fast acquisition of evolutionarily relevant fears like snakes) shows both at once. An evolutionary story is a hypothesis about history, and needs comparative or experimental evidence, not plausibility alone.
- Comparative caution cuts both ways: do not read human motives into animal behaviour (anthropomorphism), and do not assume a human behaviour is learned when cross-species patterns suggest otherwise. The examinable skill is matching each explanation to its evidence type.

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■ Checked example

Helping a sibling before a cousin fits rB>C ordering. A goose retrieving a doorknob as if it were an egg shows a fixed action pattern released by an exaggerated sign stimulus. Acquiring a fear of snakes after one bad experience, but not of flowers, illustrates prepared learning.

■ Common error

Treating Hamilton's rule as a precise human calculator, or explaining any observed behaviour as adaptive after the fact; an evolutionary claim needs evidence, not a plausible story.

ME.2 · Encoding depth and retrieval routes

- Levels of processing (Craik and Lockhart) hold that memory strength follows the depth of encoding, not the intention to learn. Shallow tasks (is the word in capitals?) give weak traces; phonemic tasks (does it rhyme?) are intermediate; semantic tasks (does it fit the sentence?) are deepest. Incidental learners doing deep tasks can out-remember intentional learners doing shallow ones.
- Maintenance rehearsal repeats material without change and holds it briefly; elaborative rehearsal links it to meaning, images and prior knowledge, producing durable traces. The generation effect – better memory for answers you produce than words you read – is elaboration at work.
- Transfer-appropriate processing adds the retrieval side: encoding helps most when it matches the test. Semantic encoding suits semantic tests; phonemic encoding can beat it on rhyme-recognition tests. Depth usually wins because most tests probe meaning, but the match, not depth alone, decides.
- Encoding specificity applies the same match principle to context: recall improves when the retrieval environment or state matches encoding. These effects sit beside the interference mechanisms from the earlier memory unit: depth builds the trace, match retrieves it.

■ Checked example

Answering "does it fit the sentence" beats "is it in capitals" on later recall, even with no warning of a test. Generating the missing word in a list beats reading it. Rhyme-encoding can beat meaning-encoding on a rhyme test – transfer-appropriate processing. Divers remembering word lists better underwater (where they learned them) show encoding specificity.

■ Common error

Equating repetition with learning: maintenance rehearsal holds material briefly but builds weak traces, and intention to learn without a deep task adds little.

HB.1 · Hormones, stress and behavioural regulation

- The stress response runs on two clocks. The fast sympathetic-adrenal-medullary path releases adrenaline within seconds; the slower HPA axis runs hypothalamus (CRH) to pituitary (ACTH) to adrenal cortex (cortisol) over minutes, mobilising energy and suppressing non-urgent functions. Chronic stress can affect health through several interacting pathways; cortisol is one part of this regulation, not a single inevitable cause.
- Key regulatory hormones: progesterone prepares and maintains the uterine lining for implantation; oxytocin drives labour contractions and milk let-down and is linked to bonding; melatonin times sleep-wake cycles; insulin and glucagon manage blood glucose in opposition. Match the hormone to the loop it serves, not to a vague mood label.
- Hormones differ from neural signals in timing and targeting: neural signalling is often faster and spatially directed; hormonal signalling often acts over longer times through circulation. These are tendencies with exceptions, not an absolute division. Only cells carrying the matching receptor respond, so a circulating hormone can still be selective.
- Feedback keeps the system bounded: cortisol inhibits CRH and ACTH release (negative feedback), so the axis ramps down when the stressor passes. Feedback failure or chronic activation – not the hormone itself – is what turns an adaptive response into a liability.

■ Checked example

A near-miss in traffic: adrenaline within seconds, then cortisol via the HPA axis over minutes; cortisol later inhibits CRH/ACTH to settle the response. Progesterone prepares the uterus for a fertilised ovum. Melatonin rises at night to time sleep.

■ Common error

Assigning a hormone a single emotion, or forgetting receptor selectivity; hormones broadcast but only receptor-bearing cells answer.

EP.1 · Epidemiology and clinical evidence

- Incidence counts NEW cases in a period (number of new diagnoses in a year); prevalence counts ALL existing cases at a time. Chronic conditions can have low incidence and high prevalence; short acute outbreaks show the reverse. A count of new cases in the United States in the past year is an incidence figure.
- Rates need denominators: incidence rate is new cases divided by person-time at risk; prevalence is existing cases divided by the population. Comparing raw counts across populations of different sizes misleads; compare rates.
- Case reports, case-control studies, cohorts, randomized trials and meta-analyses answer different questions. Random allocation can reduce baseline confounding

under appropriate implementation; observational designs need explicit confounder analysis. Quality, bias, relevance and uncertainty must be evaluated within each design. A meta-analysis cannot automatically repair weak constituent studies.

- Screening and risk run on base rates: with low prevalence, even an accurate test yields mostly false positives among positives. Number needed to treat and relative versus absolute risk are read against the baseline, not from the treatment label alone.

■ Checked example

Counting this year's new schizophrenia diagnoses measures incidence; counting everyone currently diagnosed measures prevalence. A 50% relative risk reduction from 2% to 1% is 1 point absolute. A rare-condition screen with many false positives follows directly from the low base rate.

■ Common error

Reporting a new-case count as prevalence, or quoting relative risk without the absolute baseline.

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