Active Learning

Warm-up

- On “start,” write down (on paper) as many words as you can from the list we’ve been practicing.
- When the timer ends, stop.
- Look at the original list. Count how many words you got right (exact matches; duplicates don’t count; order doesn’t matter).
- Your score = number correct / 24.

Word List

- Think
- Exist
- Home
- Grasp
- Butter
- Drink
- Beat
- Cloth
- Swift
- Lady
- Blade
- Ground
- Head
- Bath
- Cheese
- Stomach
- Sun
- Pretty
- Cave
- Whistle
- Noise
- Glue
- Command
- Fruit

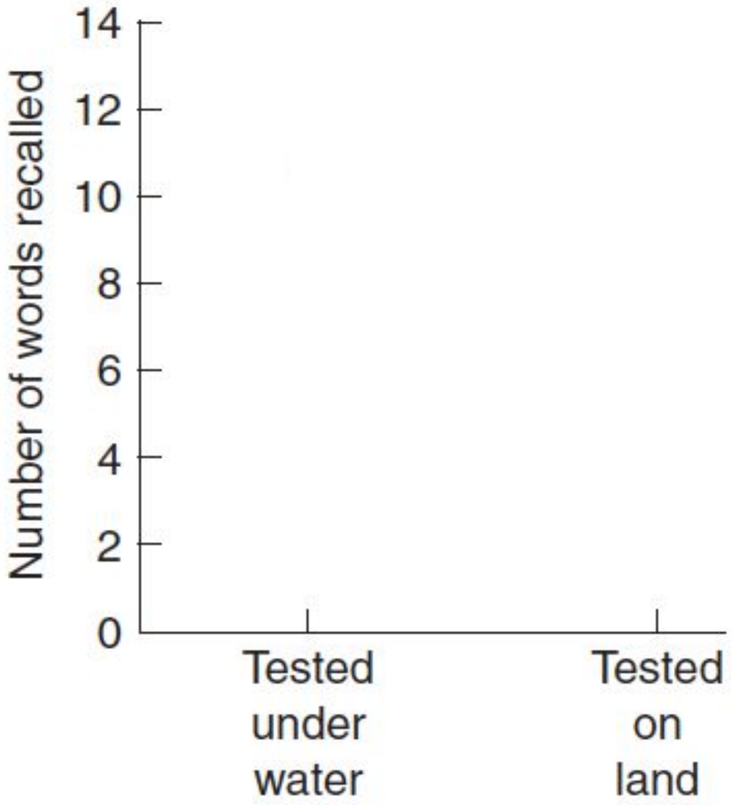
Overview

- Context-dependent learning
- Encoding specificity
- Levels of processing
- Generation effect
- Problem-oriented processing

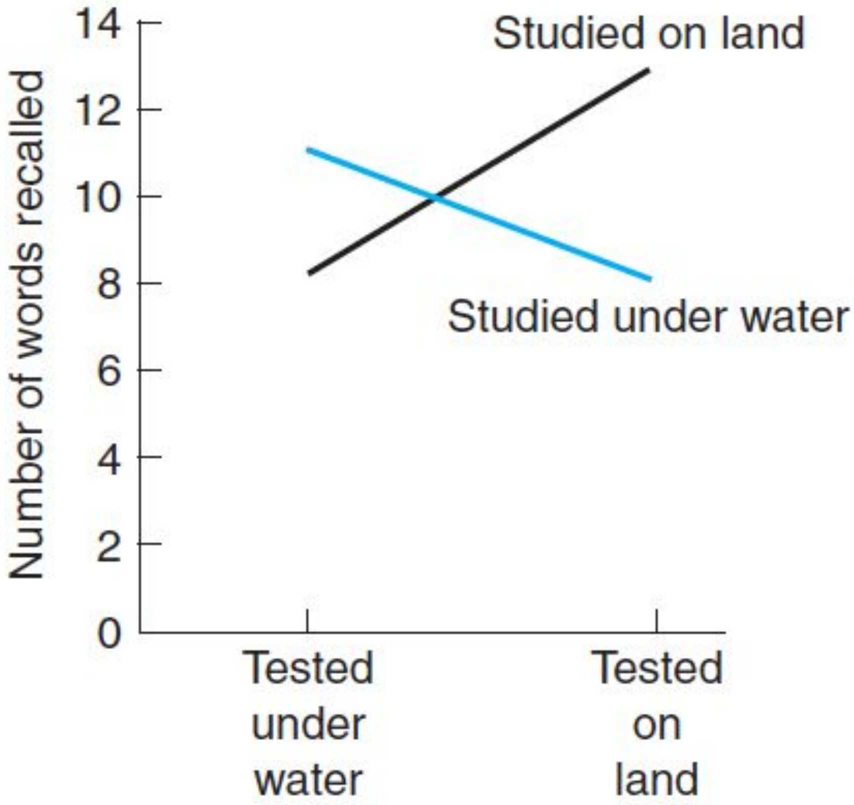
Context-dependent Learning

- Participants learned (encoded) a list of words:
  - on dry ground
  - underwater
- Recalled (retrieved) the words:
  - on dry ground
  - underwater

Context-dependent Learning



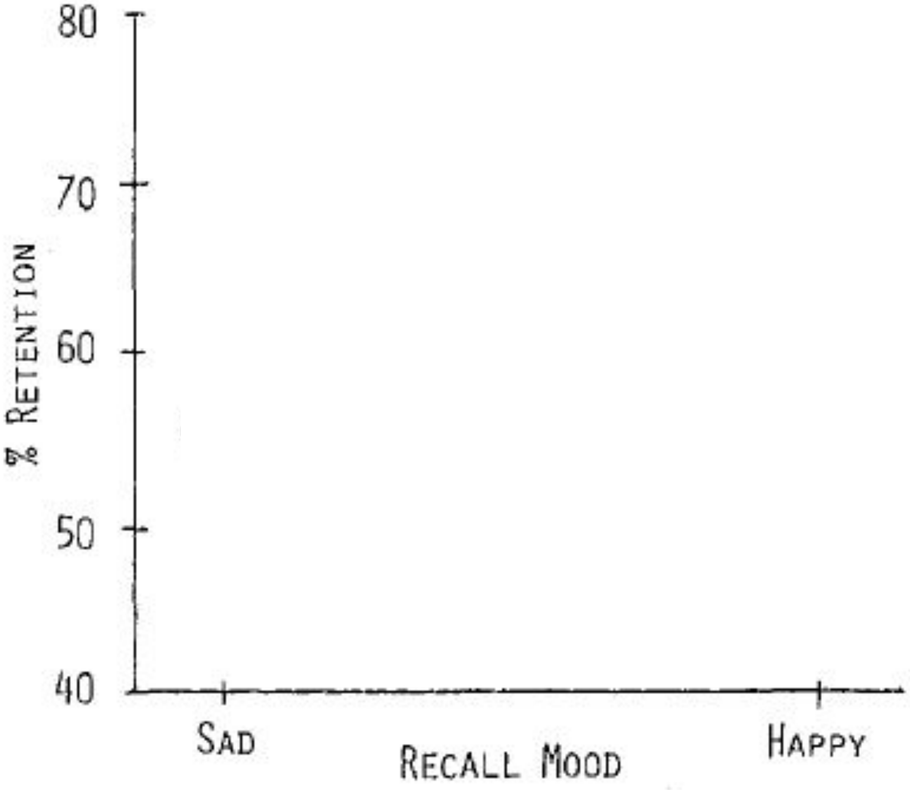
Context-dependent Learning



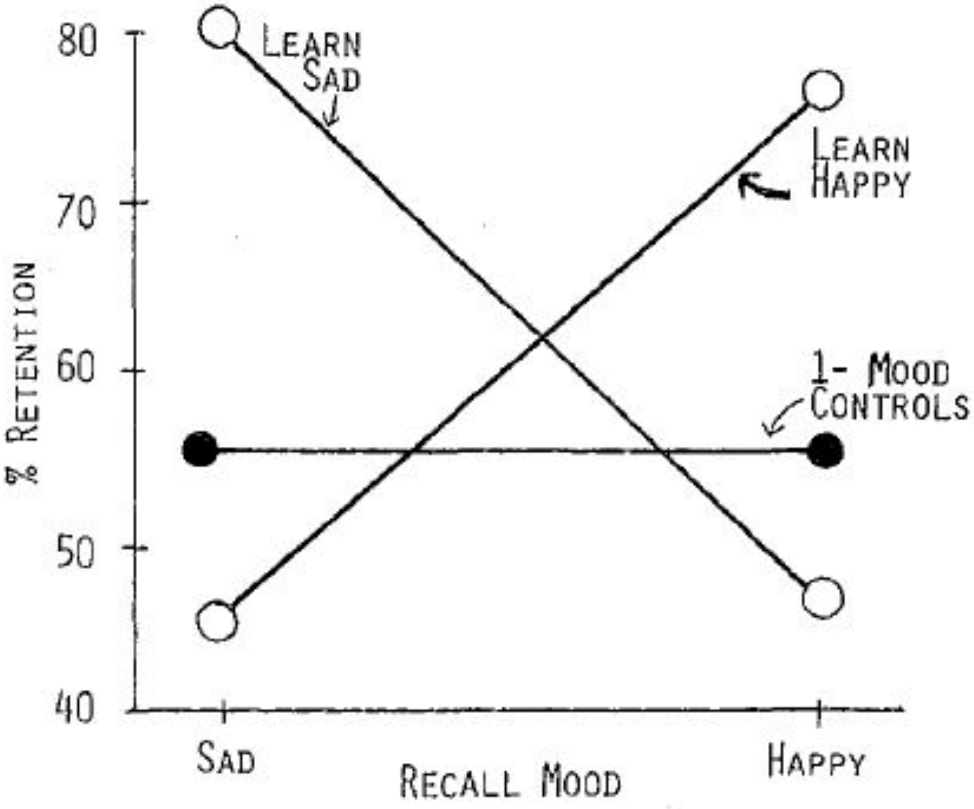
Mood-dependent Learning

- In a series of studies, Bower and colleagues manipulated the moods of participants.
  - They imagined a happy or sad scene before study (e.g., reliving a scene of scoring the winning goal in a soccer match).
  - They then studied a list of 16-20 words.
  - They then imagined a happy or sad scene before test (e.g., elatedly riding a horse along the beach).

Mood-dependent Learning



Mood-dependent Learning



Why is learning context dependent?

Why is learning context dependent?

- When you encode information in memory, you not only encode its semantics, you also include the context of learning
- When the context at retrieval is similar to the context at encoding, retrieval is facilitated

Encoding Specificity

- Group 1: Write all the FRUITS, TOOLS, ANIMALS, VEHICLES you remember.
- Group 2: “Write all the words starting with a/m/p/g/h/w/d/s/t/r/h/p/b/t/t/s you remember.

Encoding Specificity

- Apple
- Mango
- Peach
- Grape
- Hammer
- Wrench
- Drill
- Saw
- Tiger
- Rabbit
- Horse
- Panda

- Bus
- Train
- Truck
- Scooter
- Tennis
- Cricket,
- Soccer
- Boxing
- Red
- Blue
- Green
- Yellow

Why does encoding specificity work?

- When the same semantic properties of an item are emphasized at encoding and cued at retrieval, memory performance is best
- Memory is cue-dependent: you remember what you encoded, the way you encoded it.

Levels of Processing

- Group 1: Does the word contain the letter E?
  - Write “yes” if the word does contain the letter E, write “no” if it does not.
  - You must remember your task and use it for all items.
- Group 2: Does the word sound pleasant to you?
  - Write “yes” if the word sounds pleasant, write “no” if it does not.
  - You must remember your task and use it for all items.
- Please work quickly. Each word will appear for five seconds.

TABLE

NIGHT

RED

LOVE

SALT

HAPPY

NORTH

MOTHER

HIGH

ODD

HATE

DAY

GREEN

FATHER

EVEN

CHAIR

PEPPER

LOW

SAD

SOUTH

- Recall as many words as you can in one minute.

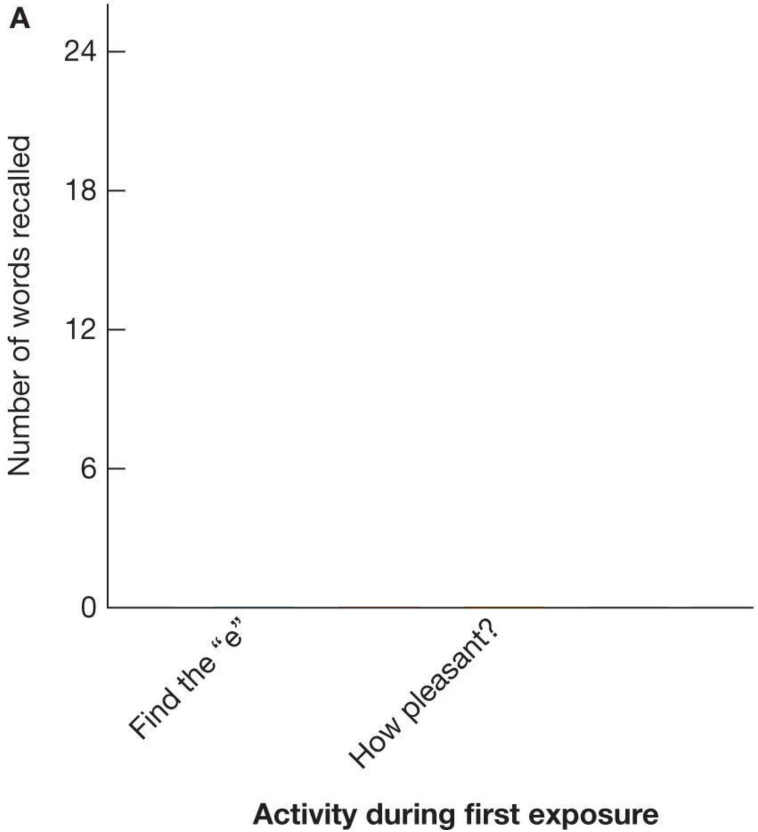
- Recall as many words as you can in one minute.
- Look at the original list. Count how many words you got right (exact matches; duplicates don’t count; order doesn’t matter).
- Your score = number correct / 20

Levels of Processing

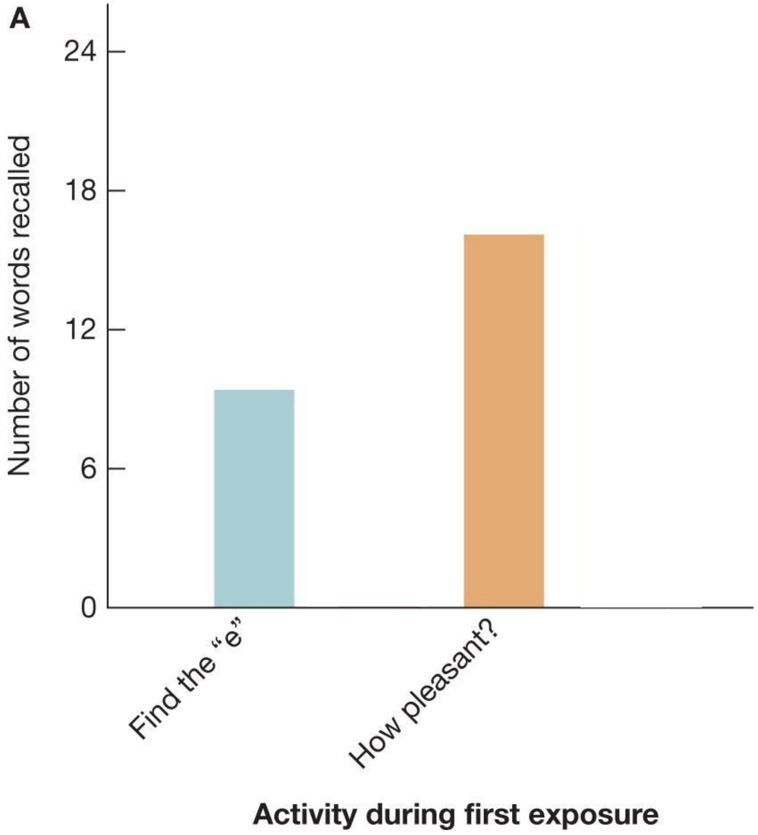
- Table
- Night
- Red
- Love
- Salt
- Happy
- North
- Mother
- High
- Odd

- Hate
- Father
- Day
- Green
- Even
- Chair
- Pepper
- Low
- Sad
- South

Levels of Processing



Levels of Processing



How do different levels of processing enable learning?

How do different levels of processing enable learning?

- Rehearsal is a phonological process
- However, we can process information in many ways, at many levels
- Levels of processing is the finding that the more deeply you process (encode) information at study, the better retrieval at test

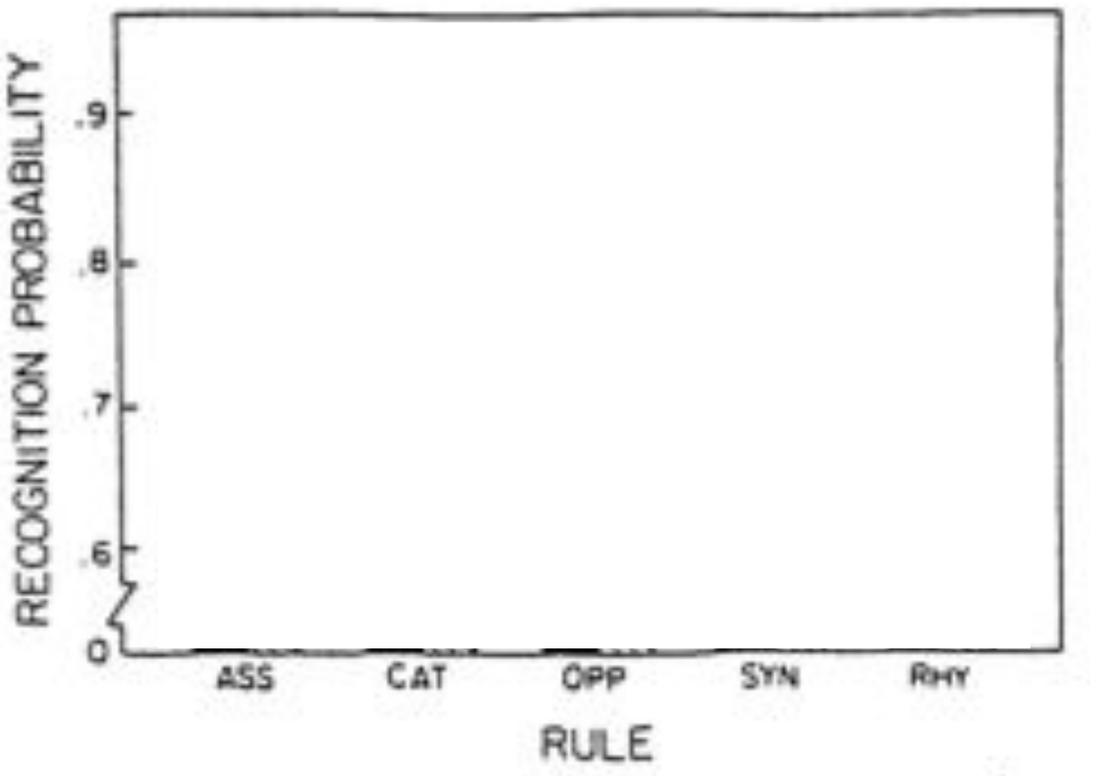
Generation Effect

Rule	Stem	Generate
Associate	Lamp_li	
Antonym	Long_sh	
Synonym	Sea_oc	
Rhyme	Save_ca	

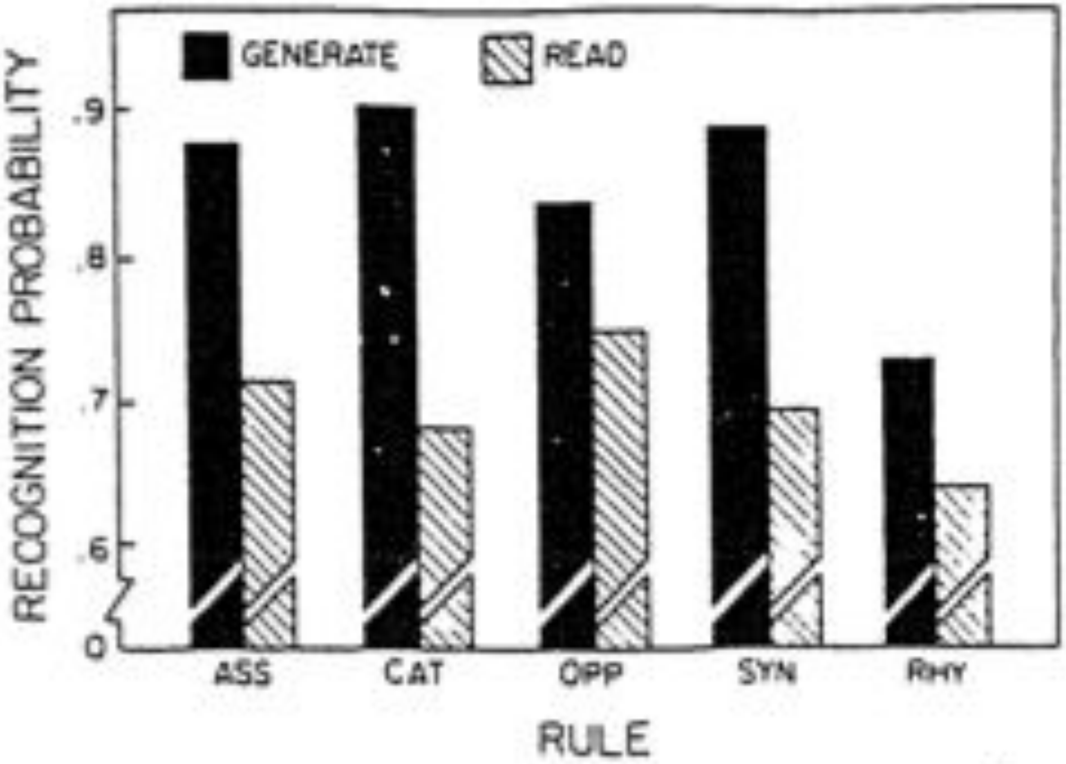
Generation Effect

Rule	Stem	Generate
Associate	Lamp_li	light
Antonym	Long_sh	short
Synonym	Sea_oc	ocean
Rhyme	Save_ca	cave

Generation Effect



Generation Effect



New approaches to instruction: Because wisdom can't be told.

Bransford, J. D., Franks, J. J., Vye, N. J., & Sherwood, R. D. (1989).

In our roles as parents, friends, supervisors, and professional educators we frequently attempt to prepare people for the future by imparting the wisdom gleaned from our own experiences. Sometimes our efforts are rewarded, but we are often less successful than we would like to be and we need to understand why (pp. 470)

What is inert knowledge?

What is inert knowledge?

- Knowing X but failing to access/use X when it would help
- Telling → students can recall ideas, but won't necessarily use them without prompts
- Students could paraphrase the IDEAL problem-solving model but didn't invoke it spontaneously during real tasks.
- Aim of instruction: prepare students for future action, not just memory
- Takeaway: Recall ≠ use; missing "conditions of use."

Access vs. memory (Asch, 1969)

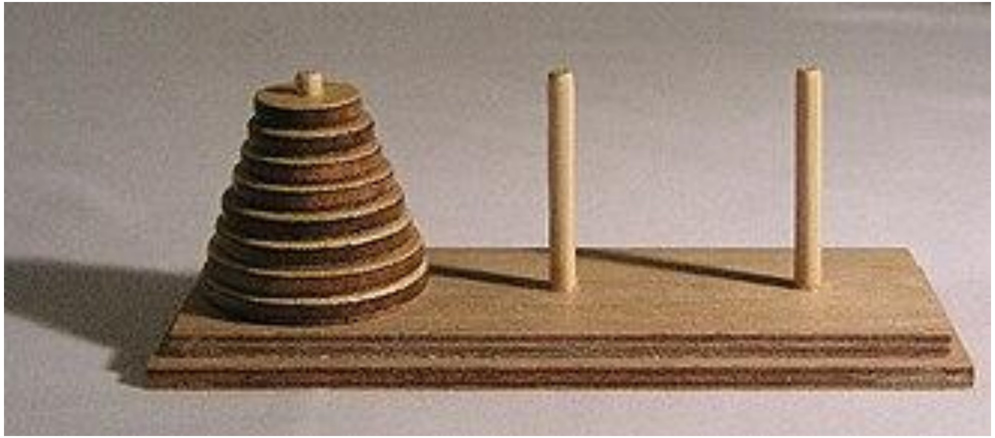
- Task: Master List 1 of pairs (e.g., C–21); then learn List 2 with one repeated pair
- Finding: If students didn't notice the repeat, it took as long as a new pair; 63% failed to notice
- But: When explicitly asked to recognize old pairs, scores were almost perfect
- ➡ Gap between uninformed access and prompted recognition

Strategy Knowledge That Sits Inert

- Children taught to cluster and rehearse category names recall more when prompted, but often fail to self-initiate later
- ➜ Strategy knowledge, too, can stay inert without cues

Analogy & Transfer: Same idea, different look

- Problem: Students often miss that two problems share the same deep structure
- Why it matters: If you don't see the deep match, you won't use what you already know
- Classic finding: Transfer usually happens only when prompted (people don't notice on their own)



A: Two phone plans: Plan X = Rs 1,000 + Rs 20/GB; Plan Y = Rs 0 + Rs 45/GB. Which is cheaper at 10 GB?

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B: Choose the cheaper ride: Rs 300 base + Rs 60/km vs Rs 0 base + Rs 90/km for 6 km.

C: Job Offer A: Rs 70,000 + equity 0.05%; Offer B: Rs 68,000 + bonus tied to ‘performance’.

D: For a lab, supplier A: Rs 6,000 for 100 test strips; supplier B: Rs 8,400 for 160 strips. Which is better?

Study: Informed vs Uninformed Access (Perfetto, Bransford & Franks)

- Setup: Students read clue statements (e.g., “Before a game starts, score is 0–0”; “A minister marries many people each week”)
- Groups: Informed = told the clues are relevant; Uninformed = saw the same clues but not told
- Trial 1: Solve insight riddles → Informed ≫ Uninformed
- Trial 2: Now both are told; compare OLD (tried before) vs NEW
- Finding: Previously Uninformed show OLD < NEW (earlier wrong guesses interfere); Informed strong on both

Problem vs Fact Oriented Acquisition

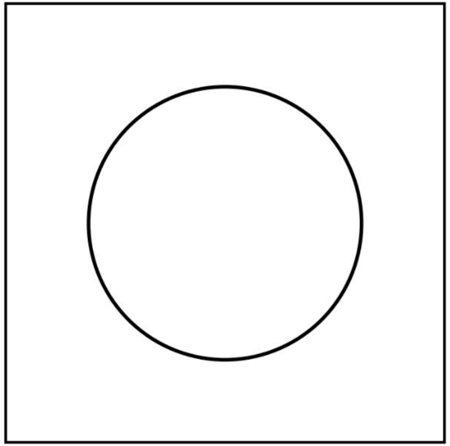
- Design: Students read 13 short science passages either as facts or embedded in a jungle-trip planning scenario
- Uninformed transfer test: plan for a desert trip
- Result: Fact group gave generic plans (“bring water/food”); Problem-context group gave specific plans (nutrition trade-offs; water ≈ 1 lb per pint)
- → Rich scenarios index what to use later

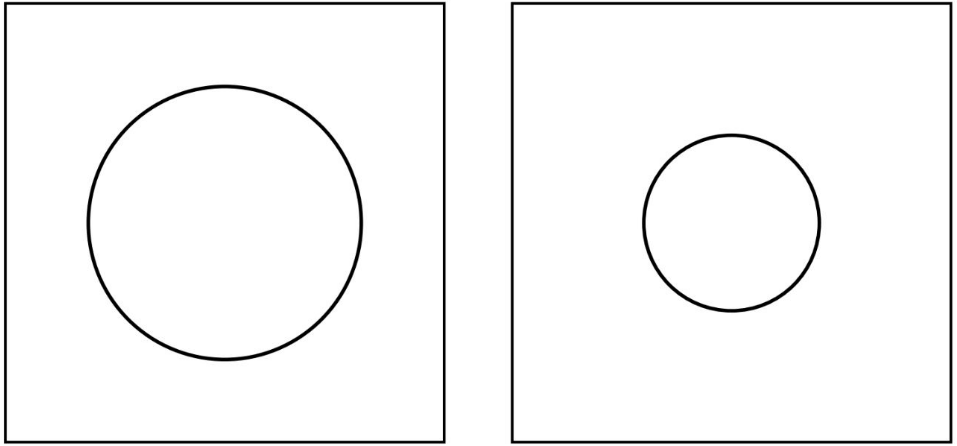
Experts vs. Novices: What They “See” (Noticing Differences)

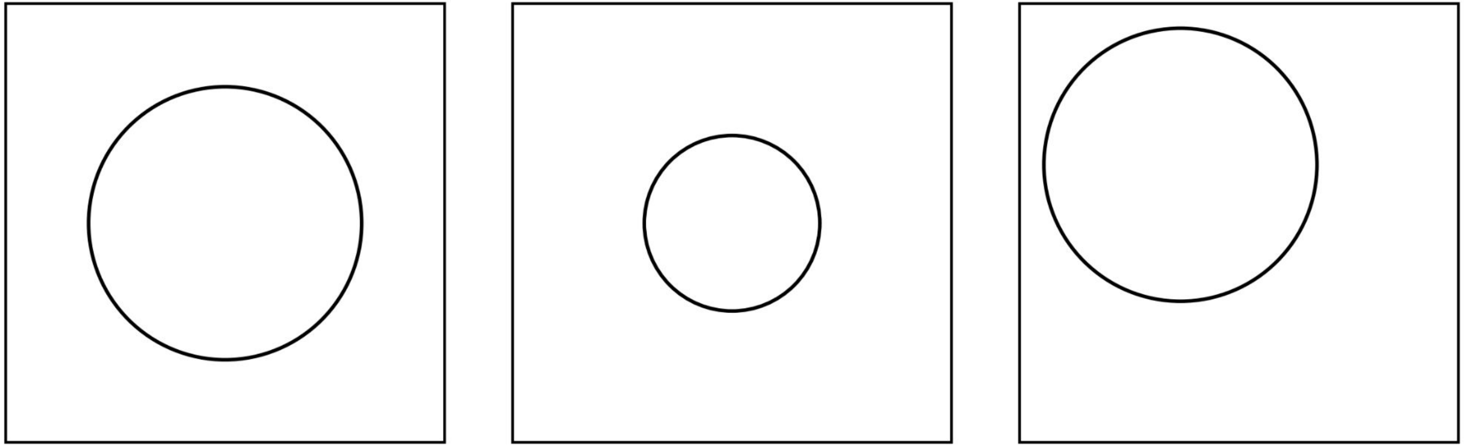
- Experts notice diagnostic features (deep structure); novices track surface (color, wording, context)
- Experts chunk patterns, anticipate constraints, and retrieve the right tool fast
- Novices often need explicit cues; without them, knowledge stays inert
- Goal of instruction: teach what to notice, not just what to name

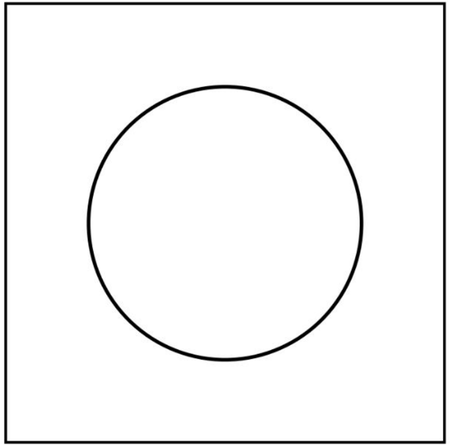
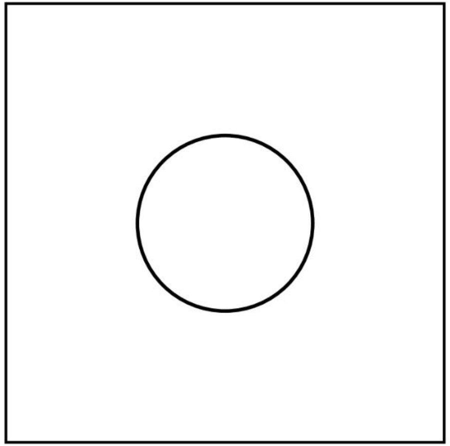
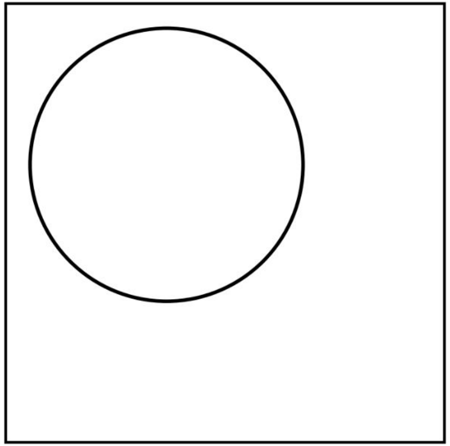
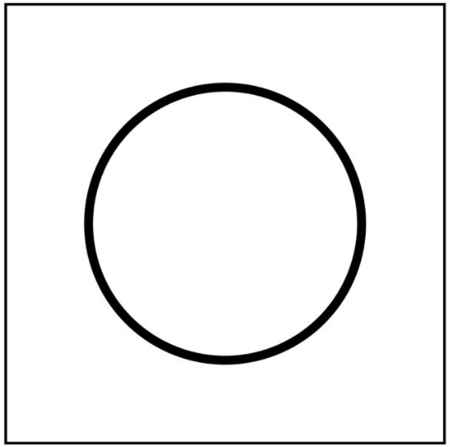
Verbal Cues: Why “Telling” Isn’t Enough

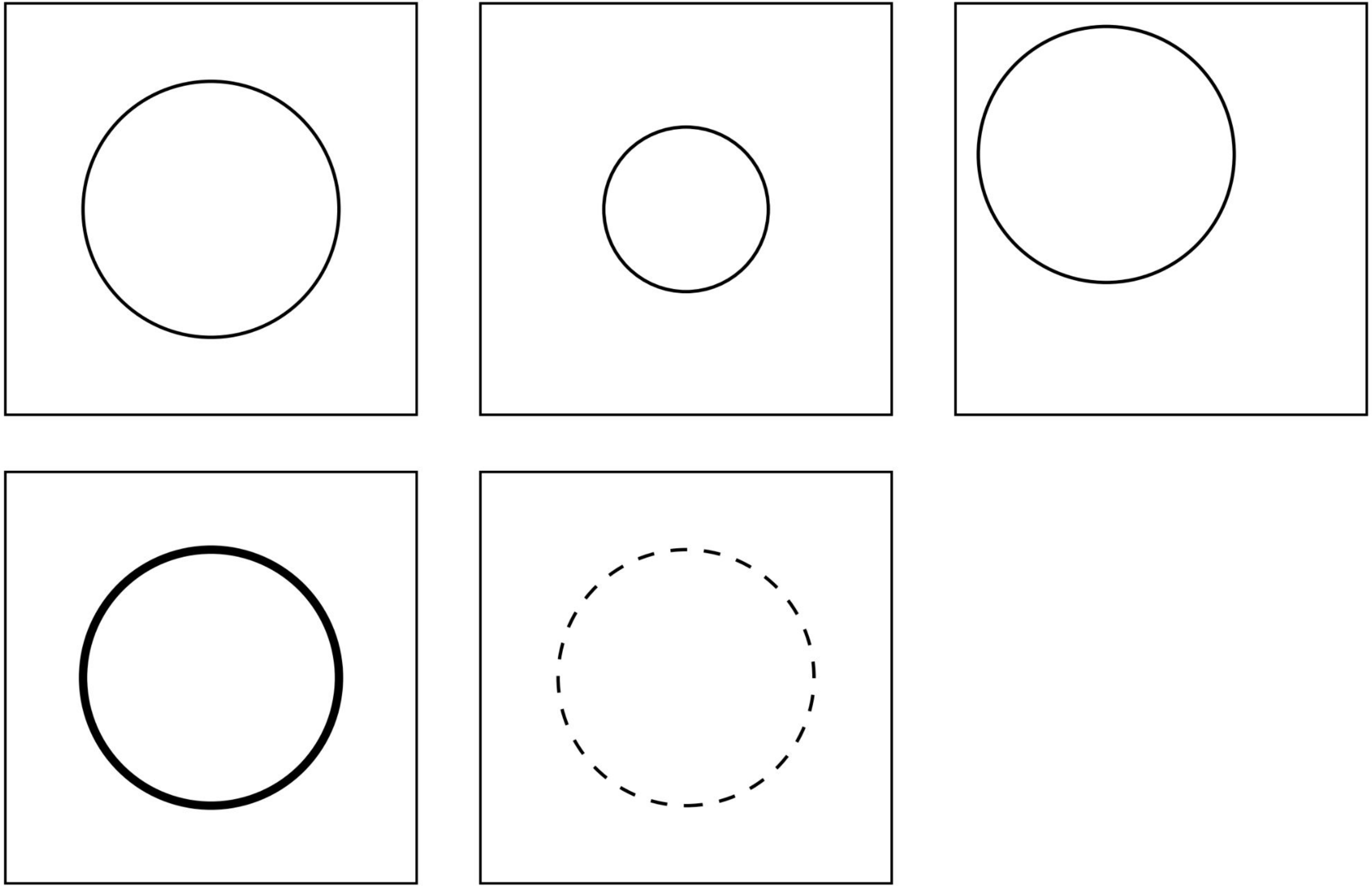
- Classroom training often relies on verbal labels
- Students can answer vignette questions, but struggle to recognize those patterns in real cases
- Verbal labels are the output of expert pattern recognition; novices weren’t taught to perceive the features
- Result: knowledge doesn’t transfer to real settings without perceptual learning via contrasts

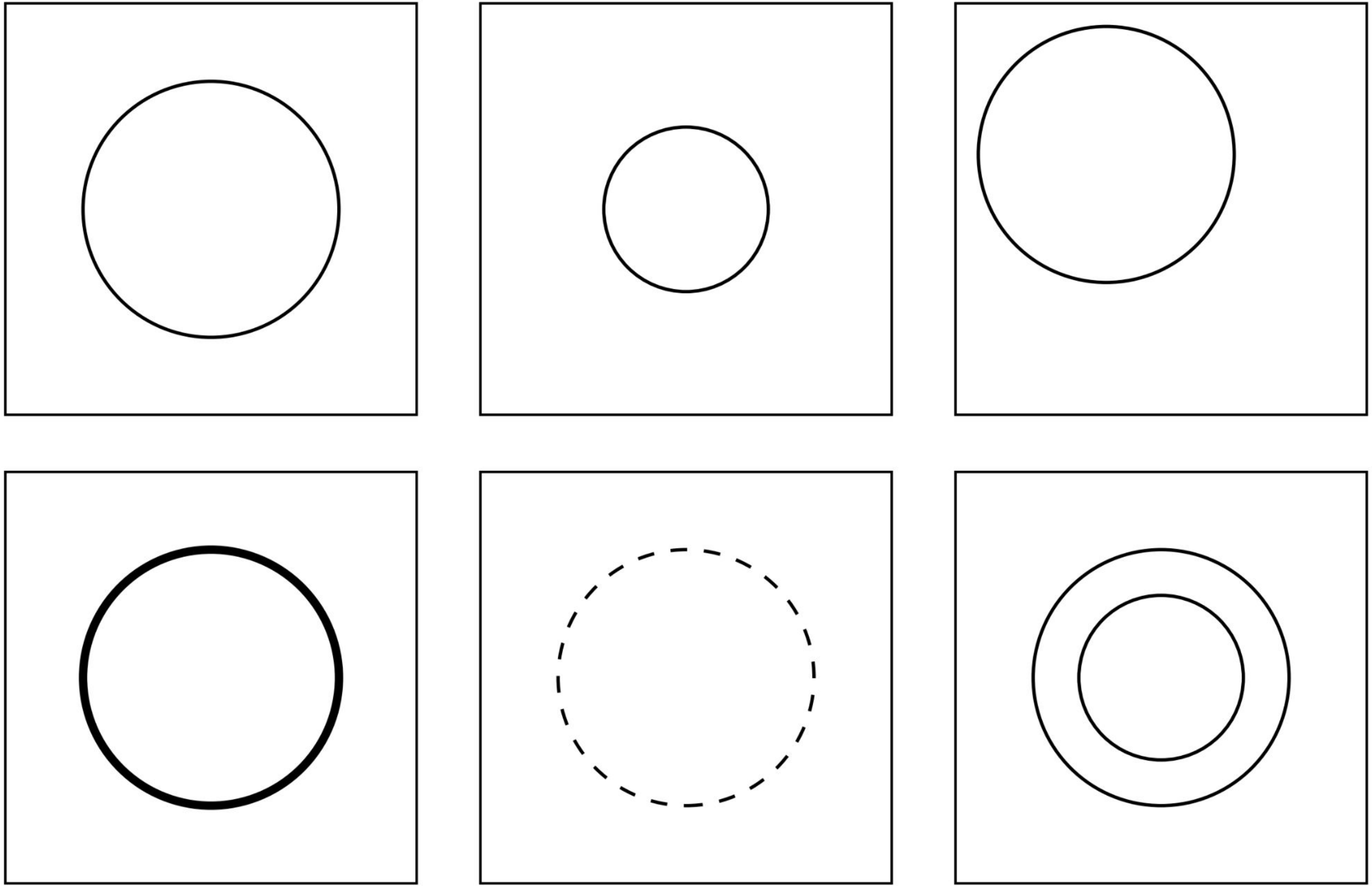










Contrast Sets: The Fastest Way to Teach Noticing

- Why it works: side-by-side differences make the diagnostic feature pop
- Pick target → curate pairs → ask for rule → apply to a new case
- Use to: launch a topic, fix a misconception, or assess uninformed transfer

Implications for Instruction

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- Start with a problem-tool framing (“Use ___ when ___ because ___”)
- Add a contrast set (2 good / 2 near-miss) to train noticing
- Include a micro-scaffold before open exploration, so they don’t lock in a wrong idea.
- Avoid over-reliance on copy-cues; vary surface, keep deep structure
- Assess at least one uninformed transfer task (changed surface; same structure)