PRINSIP-PRINSIP KOGNITIF DALAM PEMBELAJARAN

Kuliah 5

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Information Processing Theory

Shuel, 1986:

- How people attend to environmental events
- Encode information to be learned & relate it to knowledge in memory
- Store new knowledge in memory & retrieve it as needed

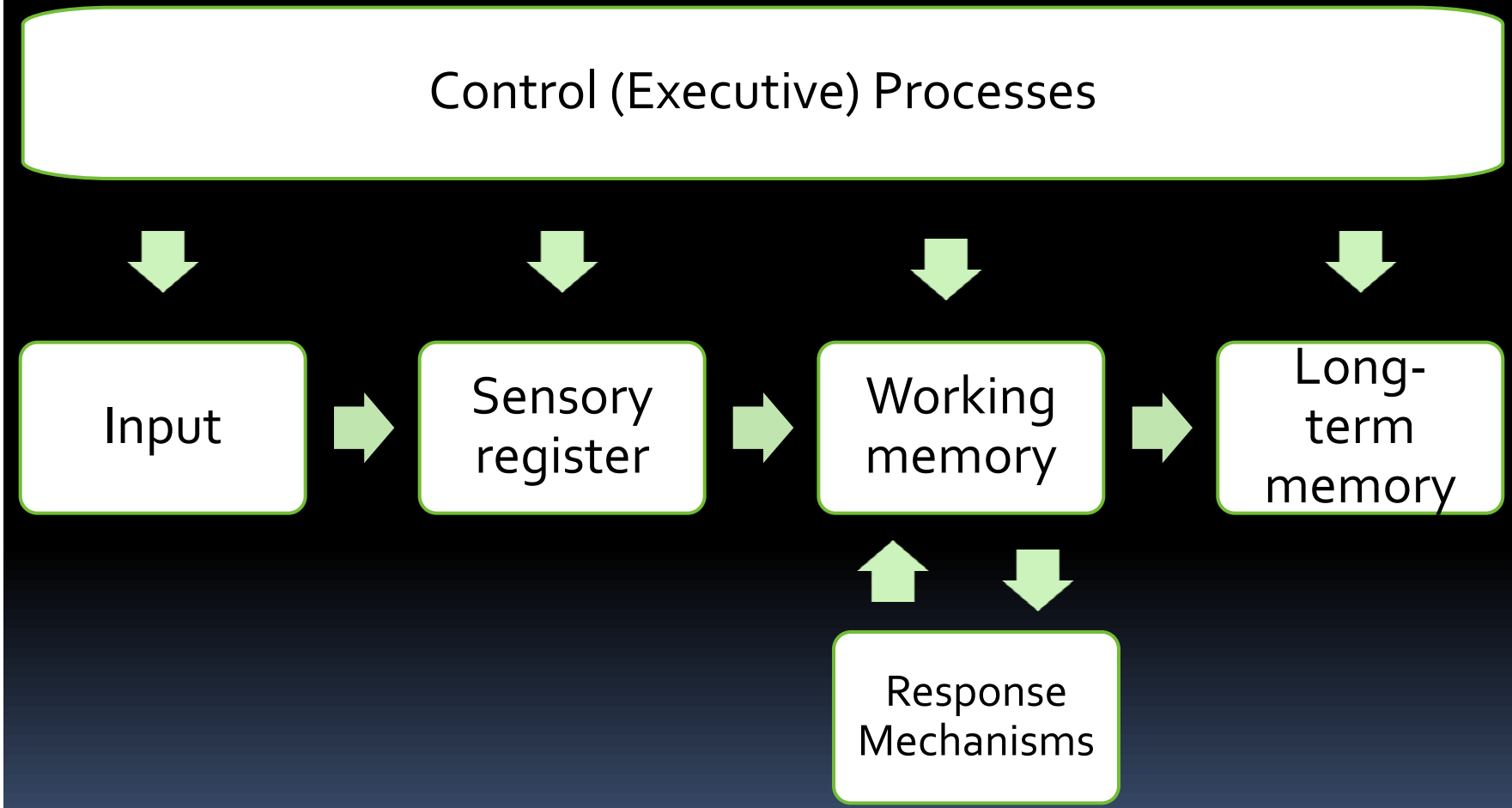
Mayer, 1996:

- Humans are processors of information
- The mind is an information-processing system
- Cognition is a series of mental processes
- Learning is the acquasition of mental representations

Information Processing System

- Focus more on internal processes that intervene between stimuli – responses
- Learners are active seekers and processors of information
- People select and attend to features of the environment, transform and rehearse information, relate new information to previously acquired knowledge, & organize knowledge to make it meaningful

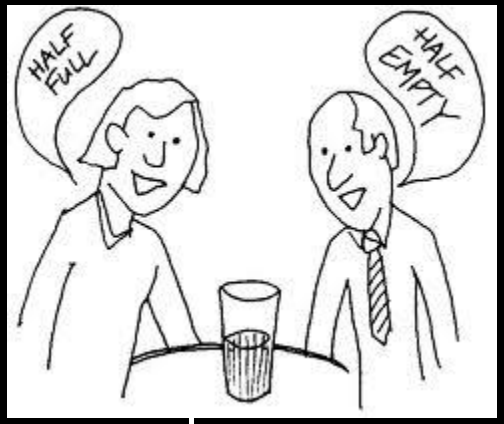
Information Processing Model of Learning & Memory



Attention

- Necessary preequisite of learning
- Limited resource
- Function of motivation and self regulation
- As skills become routine, information processing requires less conscious attention
- Differences in the ability to control attention are associated with student age, hyperactivity, intelligence and learning disabilities

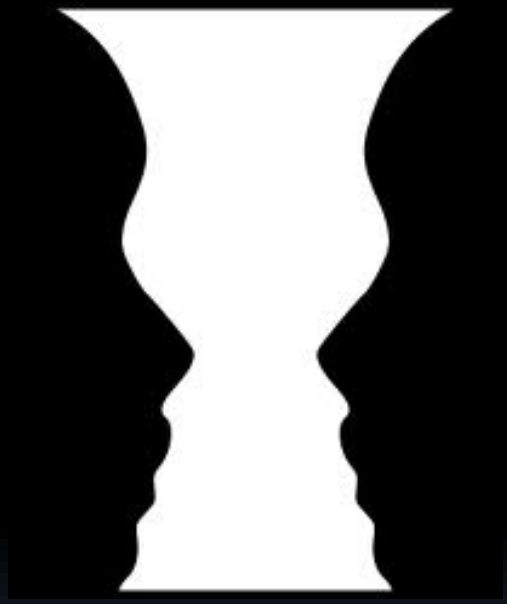
Perception



- **Gestalt Theory**
  - Human brain transforms objective reality into mental events organized as meaningful wholes.
  - The capacity to view things as wholes is an inborn quality, although perception is modified by experience and training (Kohler, 1947/1959)
  - Learning is a cognitive phenomenon involving reorganizing experiences into different perceptions of things, people or events (Koffka, 1922, 1926)
  - **Bottom-up processing**, physical properties of stimuli are received by sensory registers and that information is passed to WM for comparisons with information in LTM to assign meanings
  - **Top-down processing**, affected not only by objective characteristics but also by prior experiences and expectations

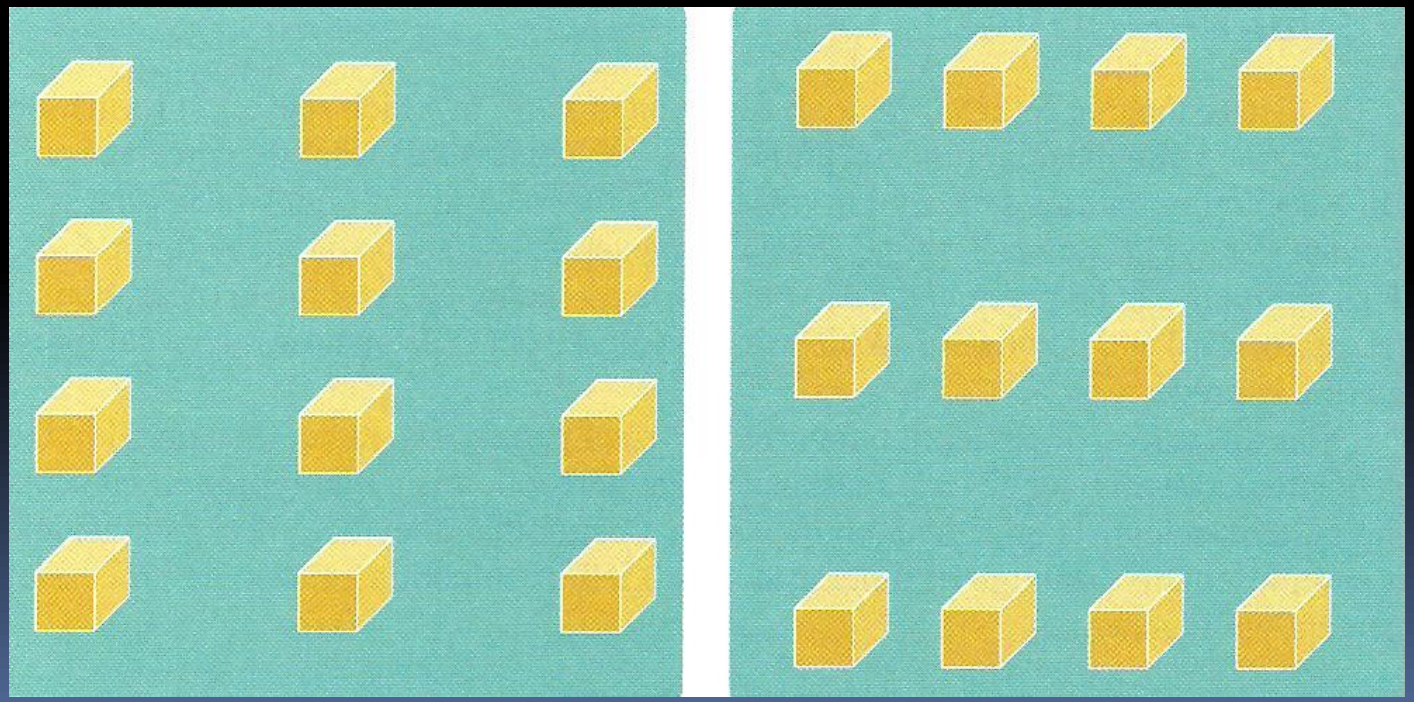
Perceptual Organization

- **Figure-ground**
  - Figur mempunyai bentuk yang lebih jelas daripada latar belakang
  - Figur mempunyai struktur, latar belakang tidak
  - Latar belakang dapat diamati sebagai gejala yang tidak punya batas tetapi figur punya batas
  - Figur terletak di depan latar belakang



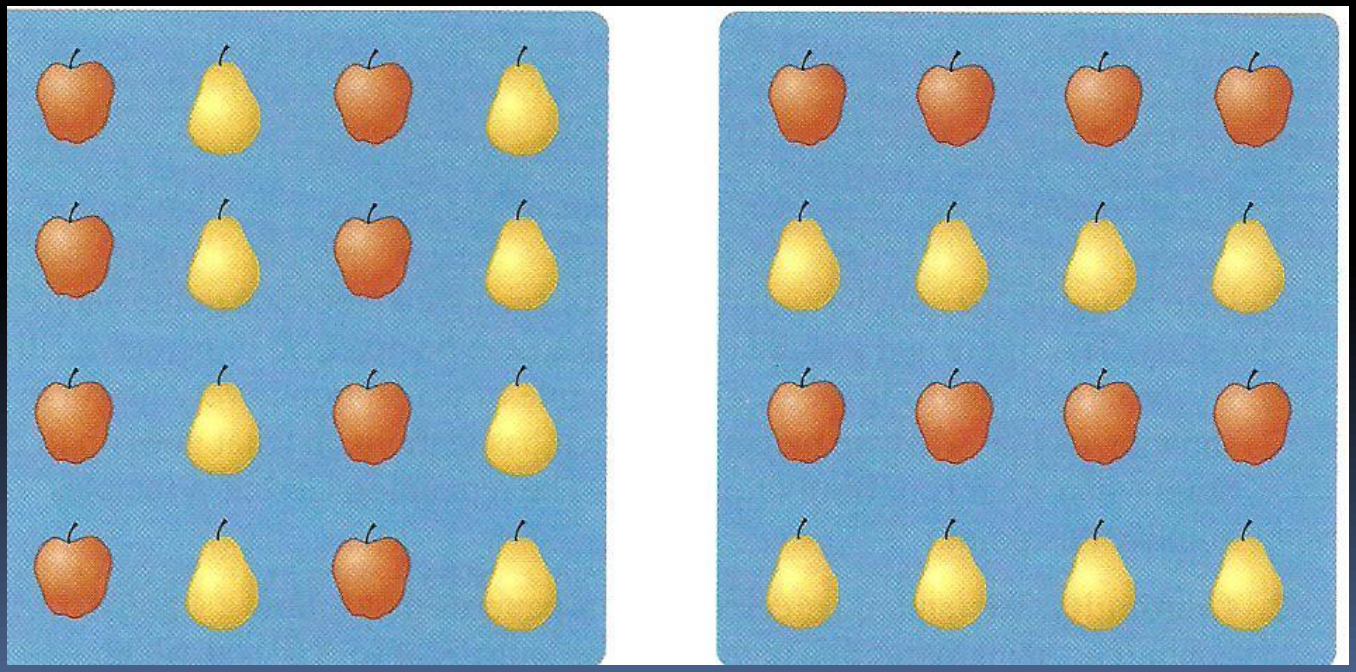
Perceptual Organization

- **Hukum kedekatan (proximity)**
  - Obyek-obyek persepsi yang berdekatan akan cenderung diamati sebagai suatu kesatuan



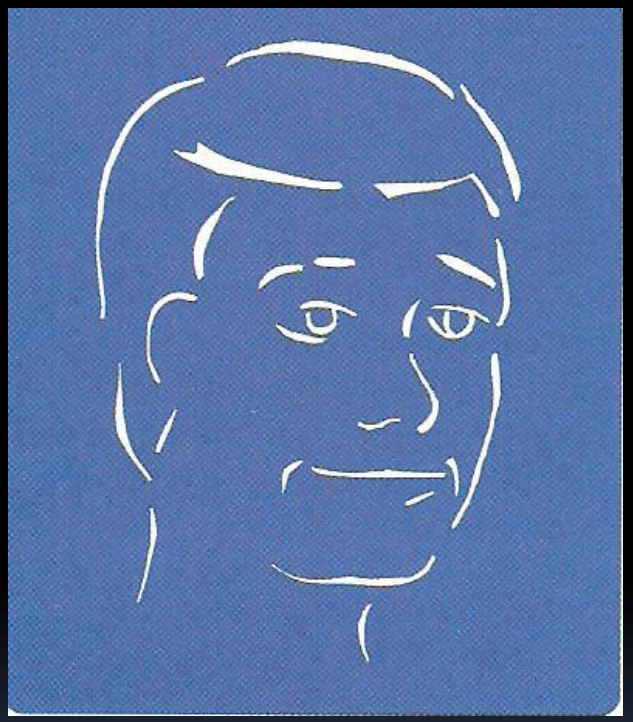
Perceptual Organization

- Hukum kesamaan (similarity)
  - Obyek-obyek yang cirinya sebagian besar sama, akan cenderung diamati sebagai satu totalitas



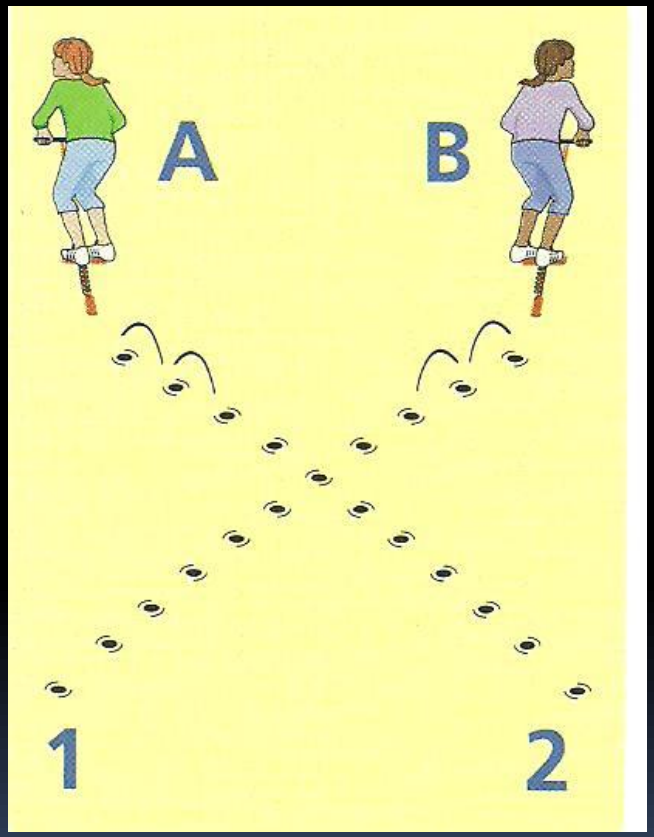
Perceptual Organization

- **Hukum bentuk-bentuk tertutup (closure)**
  - Bentuk-bentuk yang sudah kita kenal, walau hanya nampak sebagian atau terlihat sebagai sesuatu yang tidak sempurna, cenderung kita lihat sebagai suatu yang sempurna



Perceptual Organization

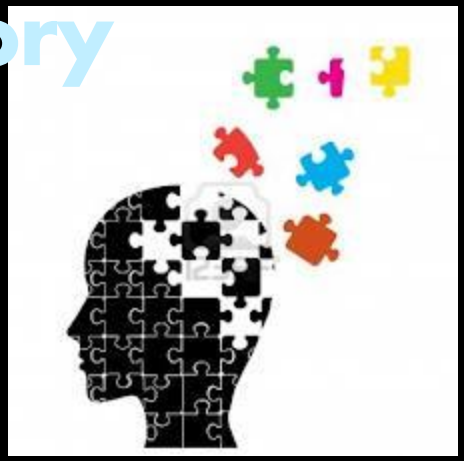
- **Hukum kesinambungan (continuity)**
  - Pola-pola yang sama dan berkesinambungan, walau ditutup oleh pola-pola lain, tetap diamati sebagai kesatuan



Perceptual Organization

- **Hukum gerak bersama (common fate)**
  - Unsur-unsur yang bergerak dengan cara dan arah yang sama dilihat sebagai suatu kesatuan

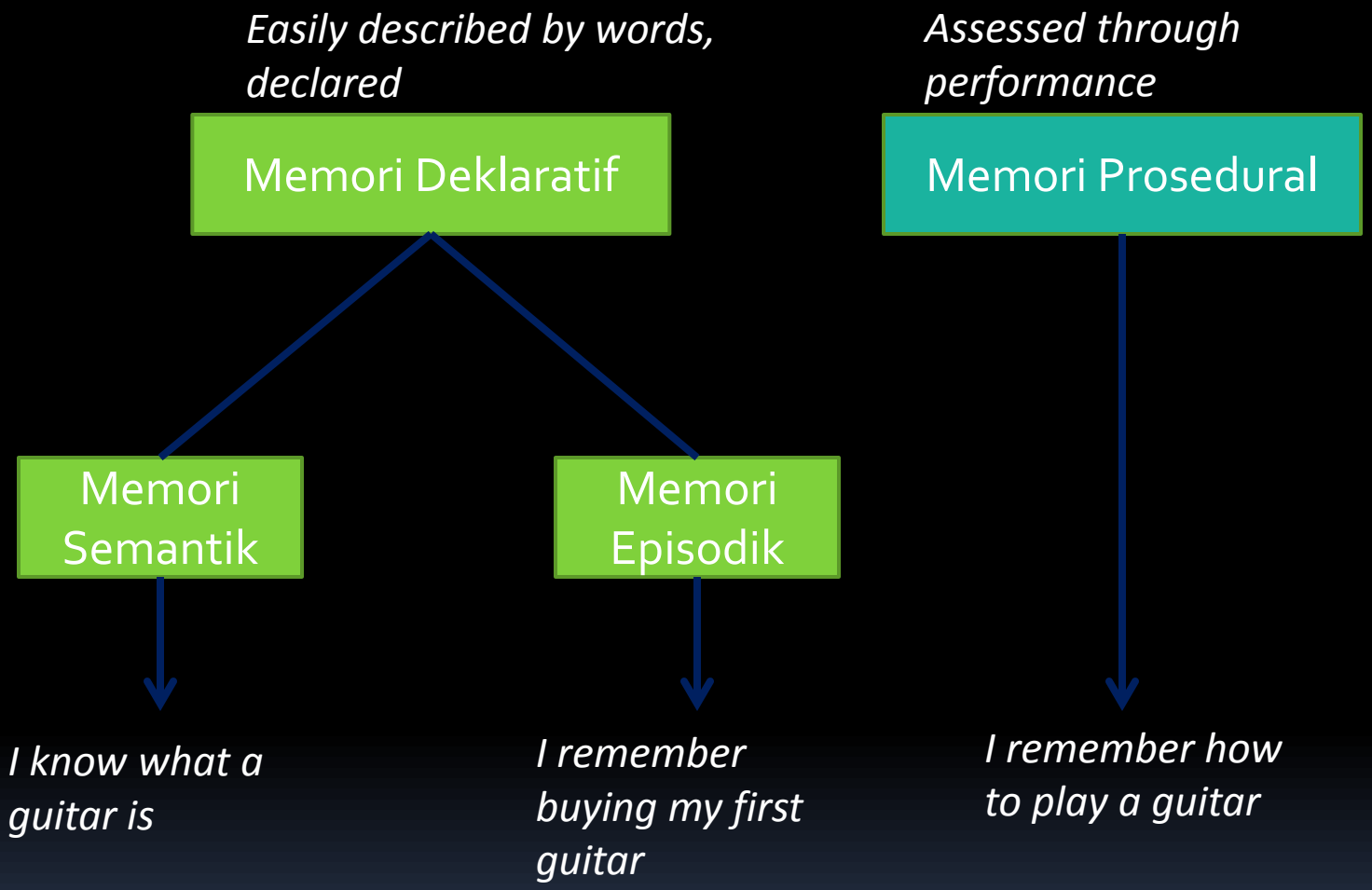
Short-Term (Working) Memory



- Limited in duration
- Limited in capacity
- Encoding: further processing of the information occurs based on what the information looks like, sounds like, or means
- Chunking strategy
- Rehearsal
- Serial-position effect

Long-Term Memory (LTM)

- The permanent storehouse of information
- unlimited capacity
- Semantic & episodic memory
- Declarative & procedural memory


Easily described by words, declared
Assessed through performance
Memori Deklaratif
Memori Prosedural
Memori Semantik
Memori Episodik
I know what a guitar is
I remember buying my first guitar
I remember how to play a guitar

LUPA

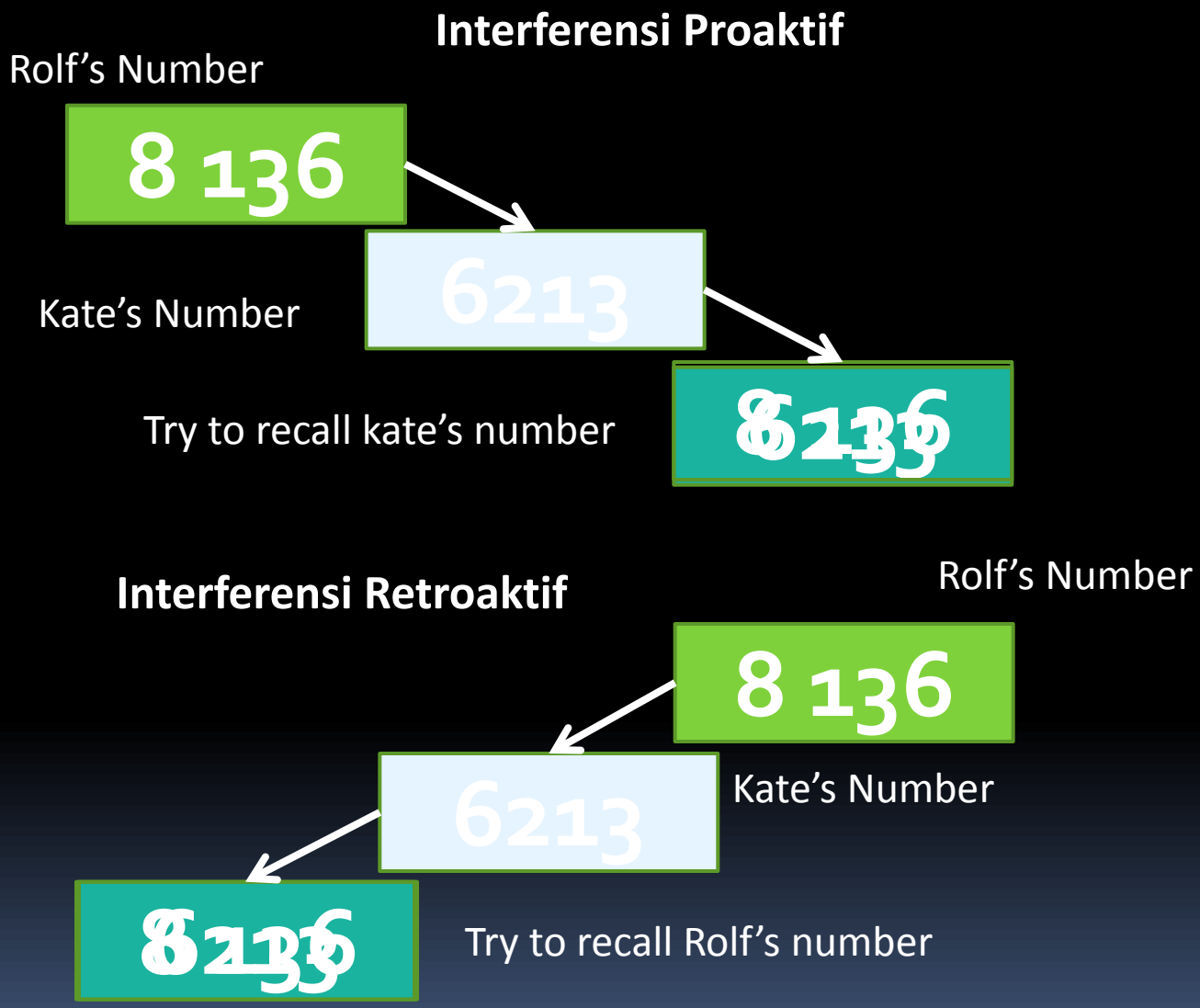
1. **Decay Theory– Teori Kemunduran**

   Memori akan menjadi semakin aus dengan berlalunya waktu bila tidak pernah diulang kembali

2. **Teori Interferensi**

   Terjadi pada informasi–informasi yang memiliki kemiripan. Informasi yang baru diterima mengganggu proses mengingat informasi yang lama, tetapi juga bisa terjadi sebaliknya.

   ≠ **replacement.** Hilangnya memori lama terkadang hanya bersifat sementara


Interferensi Proaktif
Rolf's Number
8 136
6213
Kate's Number
Try to recall kate's number
Interferensi Retroaktif
Rolf's Number
8 136
6213
Kate's Number
Try to recall Rolf's number

LUPA

- **Schema Theory – Teori Rekonstruksi**
  - Sir Frederic Bartlett (1932)
  - Informasi yang disimpan di LTM tidak dilupakan tetapi kita cenderung merubah/merekonstruksi informasi tersebut sehingga masuk akal bagi kita, berdasarkan pengetahuan dan pemahaman yang kita miliki
  - Schema diasosiasikan sebagai keyakinan, pengetahuan dan harapan pada diri seseorang.
  - Bisa terjadi ***false memory***: mengingat sesuatu yang sebenarnya tidak terjadi

LUPA

- **Teori Motivated Forgetting**
  - Kita cenderung berusaha melupakan hal-hal yang tidak menyenangkan
  - Teori Freud : pikiran sadar yang bersinggungan dengan informasi berbahaya dan tidak menyenangkan akan menekannya ketidaksadaran, mekanisme ***Repression***

LUPA

- **Retrieval Failure**
  - Kegagalan untuk mengingat karena kurangnya petunjuk
  - Kita dapat lebih mudah mengingat suatu pengalaman jika kita berada di lingkungan fisik yang sama dengan lingkungan fisik saat pengalaman tersebut terjadi
    - *De ja vu –sudah pernah melihat*
  - Kondisi mental dan fisik juga dapat membantu mengingat—*state dependent memory*
  - *Mood congruent memory* – saat sedang merasa senang kita cenderung mengingat hal-hal yang menyenangkan, dan sebaliknya

LUPA

- Lupa karena sebab-sebab Fisiologis
  - Setiap penyimpanan informasi akan disertai perubahan-perubahan fisik di otak disebut engram

  Gangguan pada engram → amnesia

  Amnesia retrograd & amnesia anterograd

Meningkatkan kemampuan memori

1. Pengulangan/ rehearsal
   - Penelitian menunjukkan bahwa pengulangan saja tidak ada artinya bila tidak dihubungkan dengan suatu konteks yang sudah dikenal
2. Konteks
   - Dapat berupa peristiwa, tempat, nama sesuatu, perasaan tertentu
3. Organisasi
   - Mnemonik : informasi diorganisasi sedemikian rupa (dihubungkan dengan hal-hal yang sudah dikenal) sehingga informasi yang kompleks mudah untuk diingat kembali
   - Contoh: metode loci, metode menghubung-hubungkan (link method), jembatan keledai

Thinking

- Thinking involves manipulating and transforming information in memory.
- Types of thinking include forming concepts, reasoning, thinking critically, making decisions, thinking creatively, and solving problems.

Reasoning

- Inductive reasoning involves reasoning from the specific to the general. Analogies draw on inductive reasoning.
- Deductive reasoning is reasoning from the general to the specific.
- Both inductive and deductive reasoning improve during adolescence.

Critical Thinking

- Critical thinking involves thinking reflectively and productively and evaluating evidence.
- Mindfulness is a concept that reflects critical thinking. Brooks and Brooks argue that too few schools teach students to think critically and deeply. They stress that too oft en schools give students a correct answer instead of encouraging them to expand their thinking by coming up with new ideas.

Problem Solving

- Creating new solutions for problems
- IDEAL to identify 5 steps of problem solving
  - **I**dentify problems and opportunities
  - **D**efine goals and represent the problem
  - **E**xplore possible strategies
  - **A**nticipate outcomes and Act
  - **L**ook back and Learn

Decision Making

- Decision making is thinking that involves evaluating alternatives and making choices among them. One type of decision making involves weighing the costs and benefits of various outcomes.
- Numerous biases (confi rmation bias, belief perseverance, overconfi dence bias, and hindsight bias) can interfere with good decision making.
- Older adolescents make better decisions than younger adolescents, who in turn are better at this than children are. Adolescents oft en make better decisions when they are calm than emotionally aroused. Social contexts, especially the presence of peers, influence adolescent decision making.

Creativity & Creative Problem Solving

- Imaginative, original thinking & problem solving
- 3 component model of creativity:
  - Domain-relevant skills; talents and competencies that are valuable for working in the domain
  - Creativity-relevant processes; work habits and personality traits
  - Intrinsic task motivation; deep curiosity & fascination with the task

Creative Thinking

- Divergent thinking: the ability to propose many different ideas or answers
  - Originality
  - Fluency
  - Flexibility
- Convergent thinking: the more common ability to identify only one answer

Metakognisi

- Knowledge about our own thinking processes
- Involves 3 skills:
  - **planning**, *how much time to give to a task?, which strategies to use?, how to start?, what resources to gather?, what order to follow?, what to skim?, what to give intense attention to?*
  - **monitoring**, *how I'm doing?, is this making sense?, am I trying to go too fast? Have I studied enough?*
  - **Evaluating**, judgements about the processes and outcomes of thinking and learning
- Develop around ages 5 to 7 and improve throughout school