

LECTURE WEEK 2



STRATEGY OF MATHEMATICS INSTRUCTIONS

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Cognitive approach on learning process



Instructional
manipulation



Learning
process



Learning
outcomes



Outcome
Performance

Learners
characteristics



Instructional manipulations



The sequence of external events including the organisation and content of instructional materials and behaviors of the teacher.

This includes what is taught, how it is taught and depends on the characteristics of the teacher and on the curriculum

Learner characteristics



The learner's existing knowledge, including facts, procedures and strategies that may be required in the learning situation

The nature of the learner's memory system, including its capacity and mode of representation in memory.

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Learning process



The learner's internal cognitive processes during learning, such as how the learner selects, organises & integrates new information with existing knowledge

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Outcomes



- **Learning outcomes**
 - The cognitive changes in the learner's knowledge or memory system, including newly acquired facts, procedures and strategies
- **Outcome performance**
 - The learner's performance & behaviour on tests that measure the amount of retention or the ability to transfer knowledge to new learning tasks

Two main points on learning process:



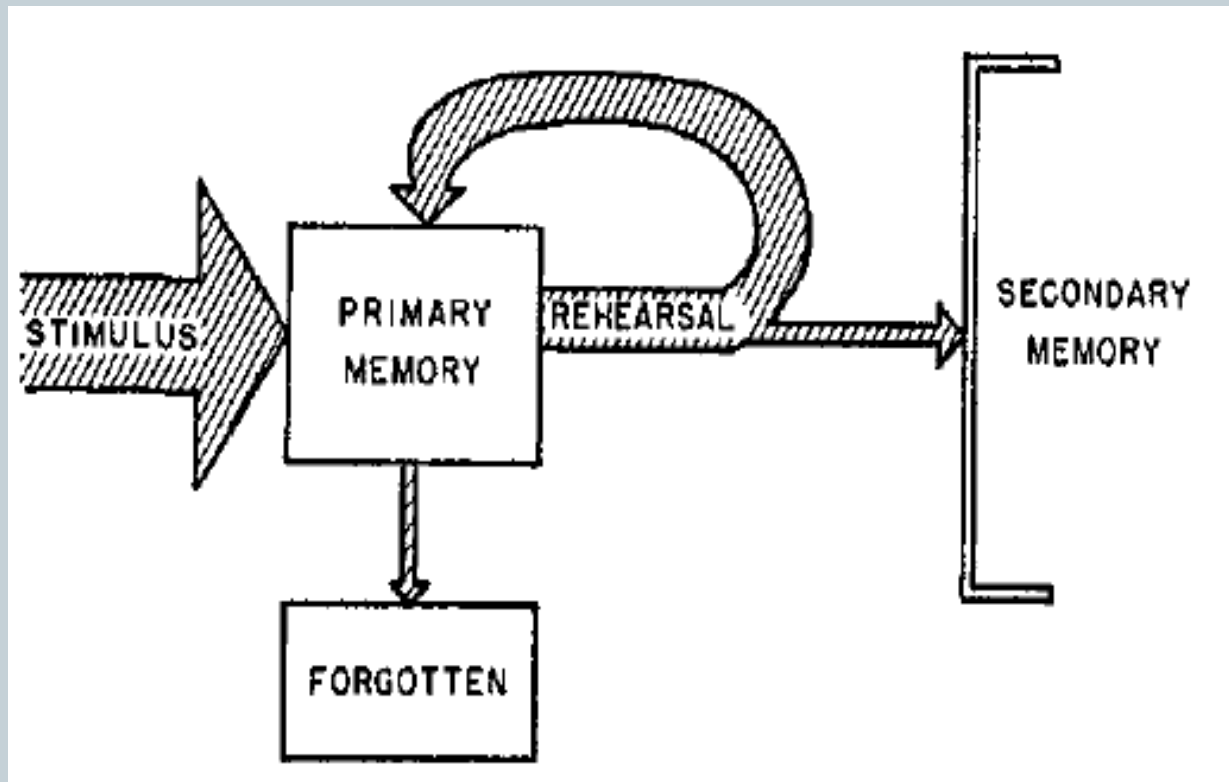
- **Learner centered approach**
 - Learner characteristics
 - Learning process and outcomes
 - Instructional manipulations affects changes in the learner's knowledge
- **Learner is an active information processor**
 - Knowledge is constructed by learner
 - ✦ HOW AND WHERE IS KNOWLEDGE IS CONSTRUCTED?

INFORMATION PROCESSING SYSTEM



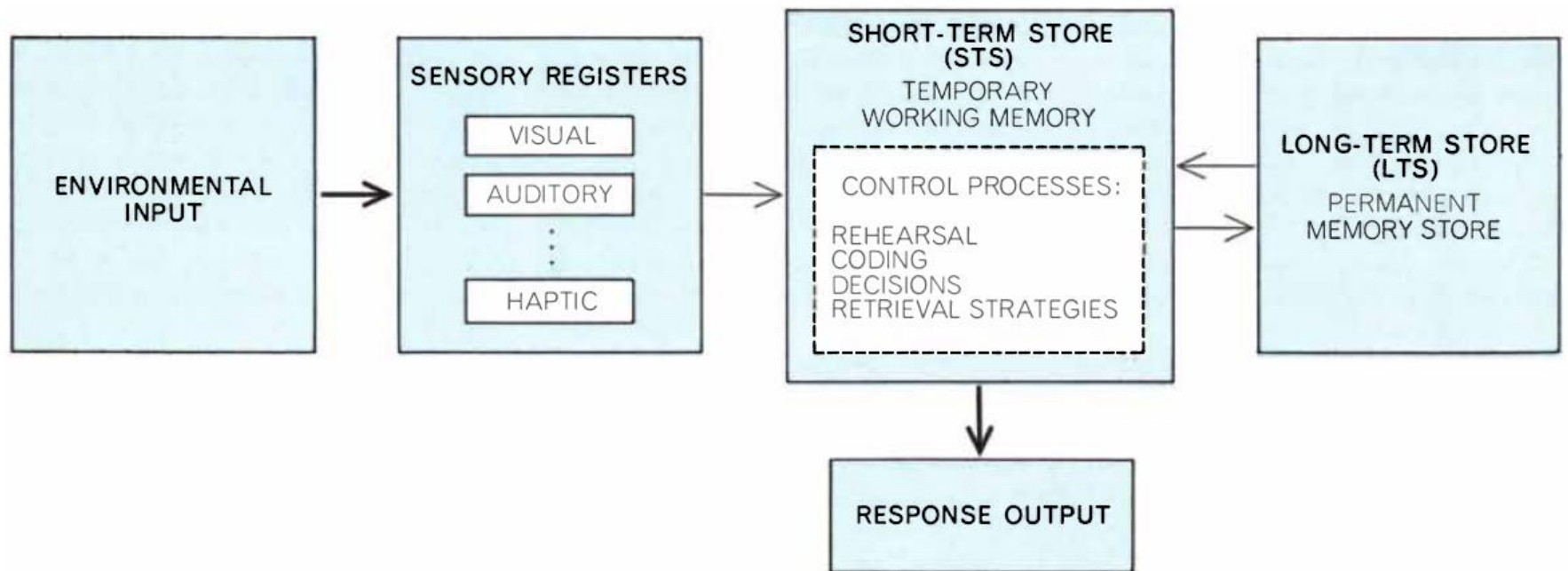
- Human memory
 - Human cognitive architecture
 - ✦ The modal model

The primary and secondary memory system ([Waugh & Norman, 1965, p. 93](#))



The information flow

(R.C. Atkinson & Shiffrin, 1971, p. 82)

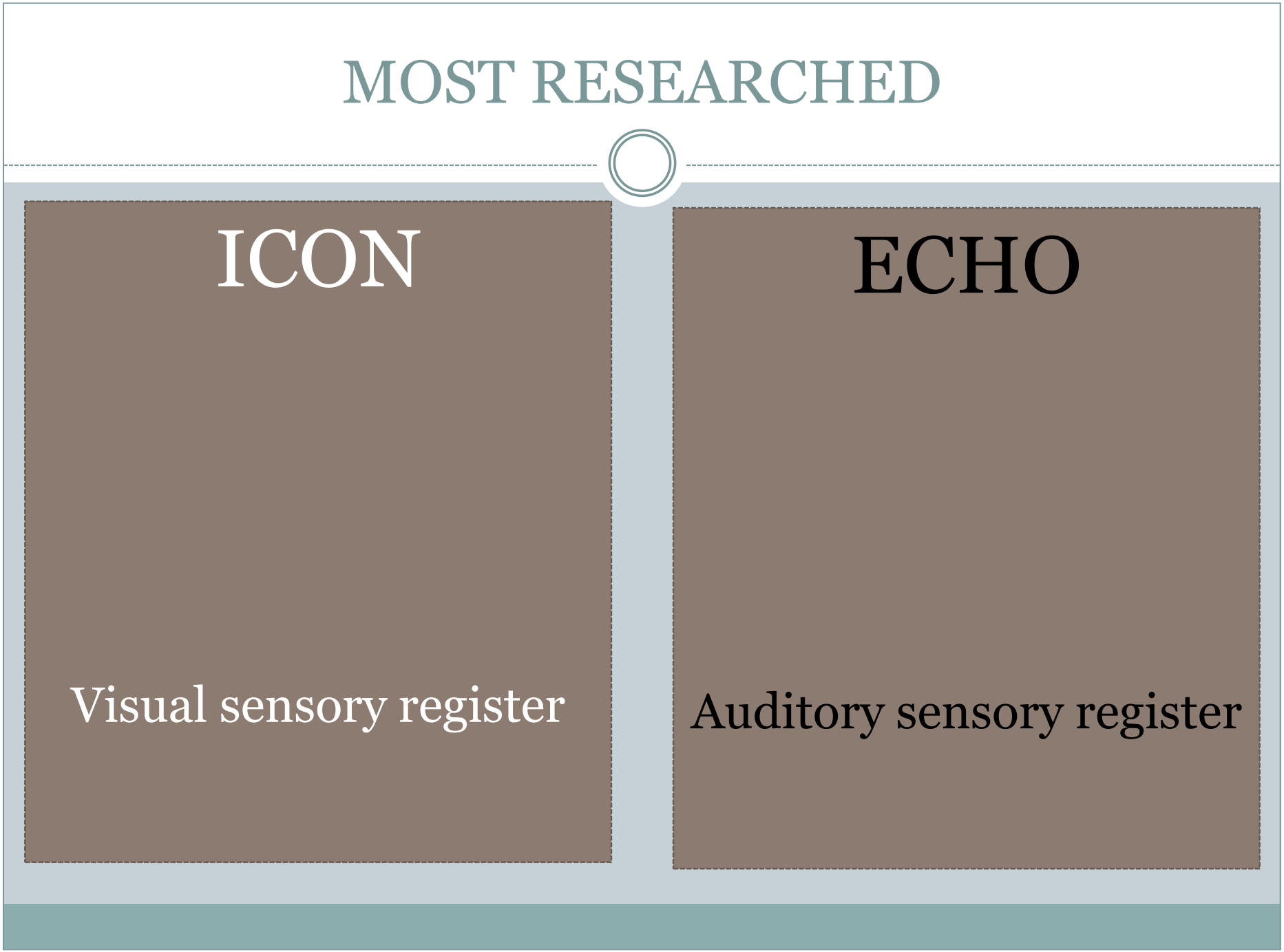


SENSORY MEMORY



1. Sight
2. hearing,
3. Smell
4. Taste
5. Touch

MOST RESEARCHED

The diagram is a conceptual model of sensory memory. At the top, the text 'MOST RESEARCHED' is centered in a teal serif font. Below this, a horizontal dashed line spans the width of the diagram. In the center of this line is a small circle with a double outline. Below the dashed line, there are two large, brown rectangular boxes with dashed borders, separated by a light blue vertical bar. The left box is labeled 'ICON' in white serif font at the top and 'Visual sensory register' in white serif font at the bottom. The right box is labeled 'ECHO' in black serif font at the top and 'Auditory sensory register' in black serif font at the bottom. The entire diagram is set against a light blue background, with a teal horizontal bar at the very bottom.

ICON

Visual sensory register

ECHO

Auditory sensory register



C	Z	K	L
D	P	M	B
R	L	X	N

Characteristics of sensory memory



- **LIMITED IN CAPACITY AND DURATION**

Sperling's & Darwin's research

7-9 pieces at once

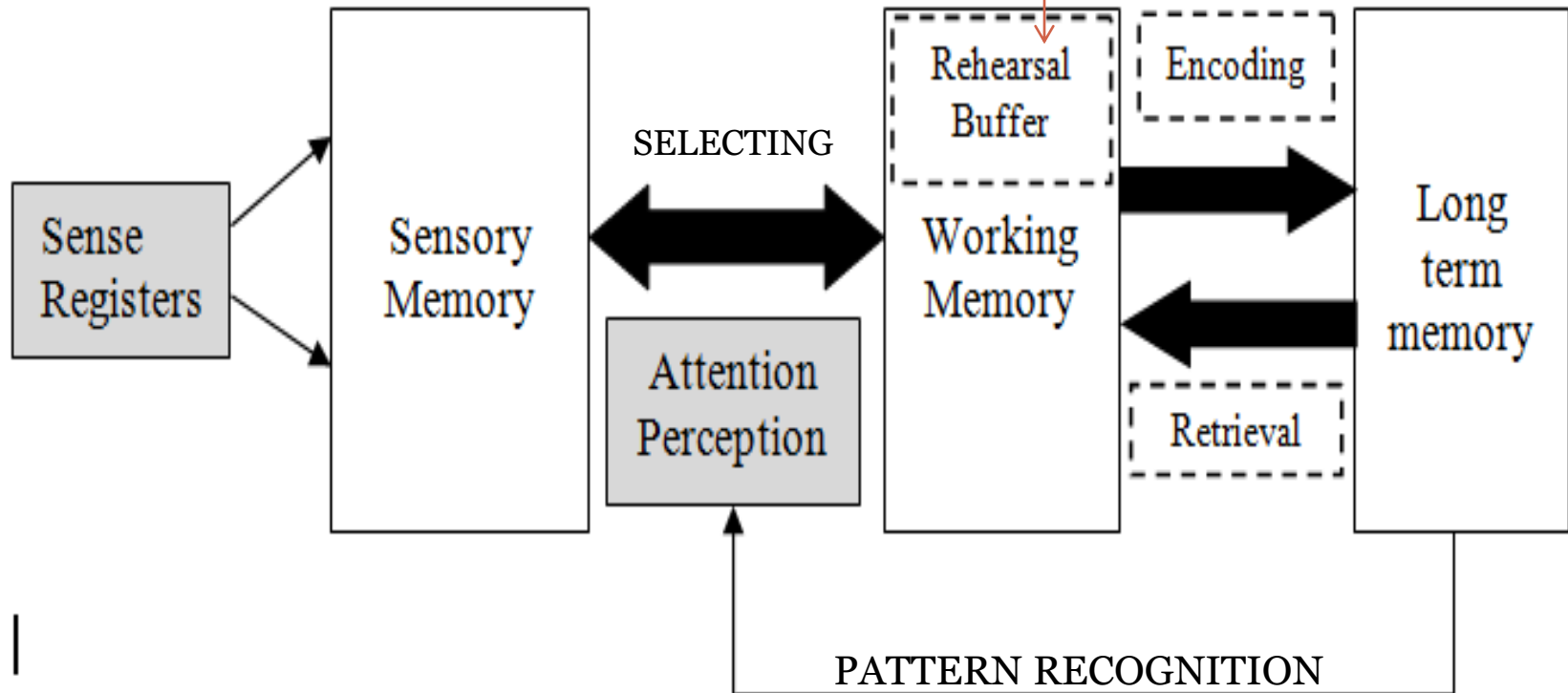
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or approx 3 seconds (for echo)

WHAT IS THE IMPLICATION ON LEARNING?

LEARNING

PROCESS: organise information, build connection, construct knowledge



STEPS ON SENSORY MEMORY



- ATTENTION AND PERCEPTION
- PATTERN RECOGNITION



PRIOR KNOWLEDGE
CONTEXT



Jika tanggal 4 Juni 2008 jatuh pada hari Senin, jatuh pada hari apakah tanggal 27 Juni 2008?



- Lecture
- Lettuce
- 27
- Kelapa
- Ice cream
- Cot
- Independence
- Building

- Icon
- 1965
- Sebaiknya
- Charger
- Moonlight
- Gula the kopi
- Bluw
- Amboi

WORKING MEMORY



- LIMITED IN CAPACITY AND DURATION
- Miller's research: The magic number of seven
- Cowan's research: Less amount

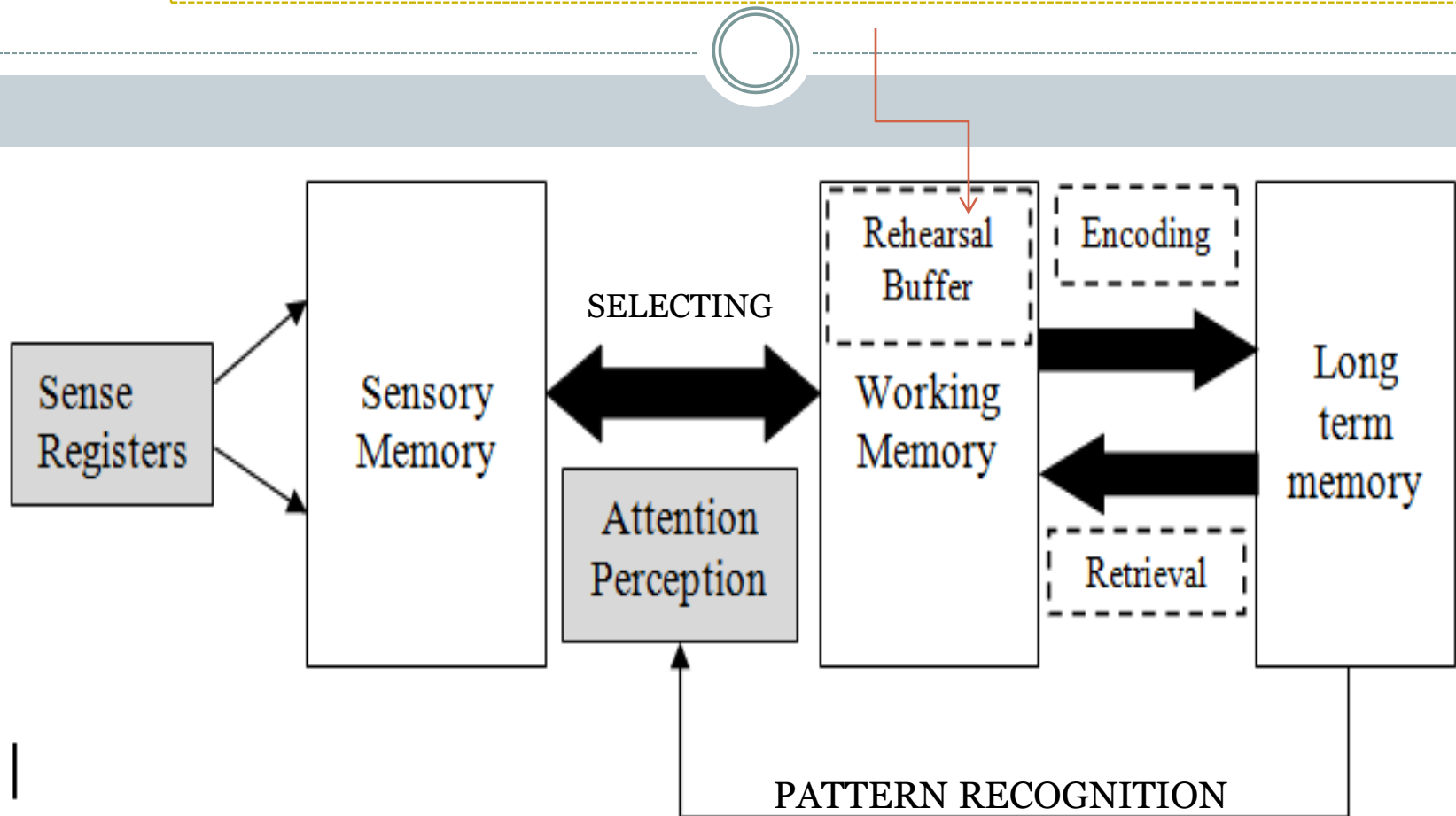
LONG TERM MEMORY



- Permanent storage of knowledge
- Unlimited capacity and duration
- Assist perception, attention, pattern recognition and retrieval processes

LEARNING PROCESS:

organise information, build connection among information and integration with prior knowledge, and eventually construct knowledge, encode knowledge to LTM



GROUP DISCUSSIONS



- Discuss to re-learn and express your understanding about:
 - Learning processes from cognitivist perspective
 - How knowledge is constructed by learner
- Hint:
 - ✦ Refer to the diagram we discussed before

Today's remark:



- How information is processed = HOW STUDENTS LEARN NEW MATERIAL; which is organised by:
 - Human cognitive architecture
 - ✦ The modal model
 - Sensory memory, Working memory, Long term memory
- These human cognitive architecture implies on how student learns...and more importantly, on how teacher designs learning strategy!