

LECTURE WEEK 3
PSYCHOLOGY OF MATHEMATICS LEARNING

ENDAH RETNOWATI
e.retno@uny.ac.id

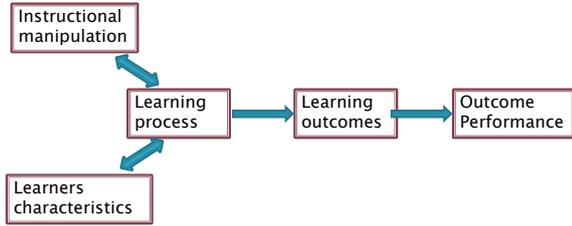
THANK YOU

User picture	User name	Full Name	Country	Last access	Completed tasks
	Endah Retnowati	YOGYAKARTA	Indonesia	7 secs	Unlimited
	13201241045 Nurul Purnamasih	BANYUWAS	Indonesia	1 hour 58 mins	25 February 2015
	13201241030 Nur Anisa Dika Maharani	YOGYAKARTA	Indonesia	2 hours 43 mins	25 February 2015
	dyah padmi	Bojonegara		4 hours 4 mins	4 March 2015
	13201241015 Dwi Aditya Saraswati			8 hours 5 mins	21 February 2015
	13201344004 Ida Siti Mahyuningah			10 hours 48 mins	3 March 2015
	13201241068 DEWI SAPUTRI	MAGELANG	Indonesia	11 hours 48 mins	2 March 2015
	13201241041 Rizqi Khikha Analia	PEKALONGAN	Indonesia	13 hours 6 mins	3 March 2015
	13201241027 Vicky Triyana Kurniasari			20 hours 35 mins	3 March 2015
	13201241082 Dika Adhika Khatma	BAWITTA	Indonesia	23 hours 51 mins	25 February 2015
	13201241026 Citra Adi Kusumadewi	KEBLAMEN	Indonesia	1 day	23 February 2015
	13201344006 Adhik Nur Indah Sari	YOGYAKARTA	Indonesia	1 day	25 February 2015

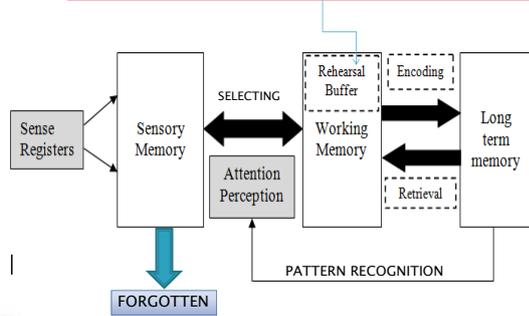
Things to rehearse:



Cognitive approach on learning process

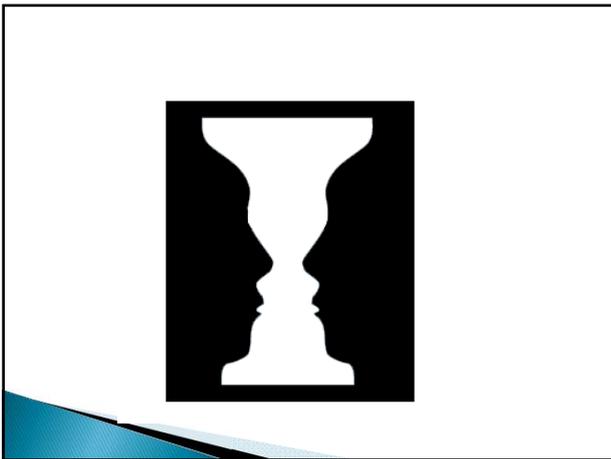


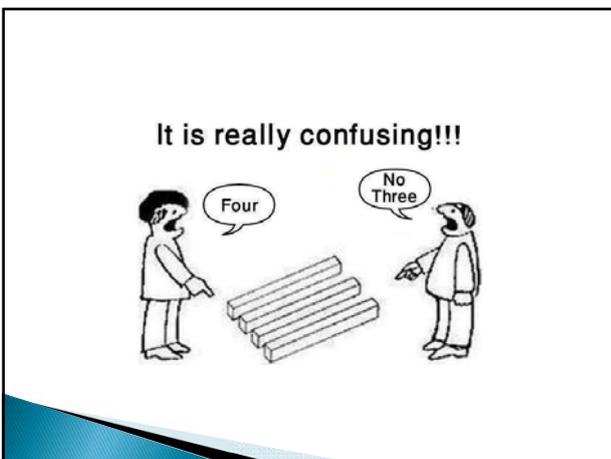
LEARNING PROCESS:
organise information, build connection among information and integration with prior knowledge, and eventually construct knowledge, encode knowledge to LTM

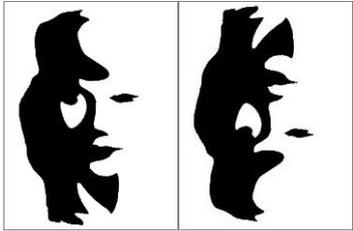










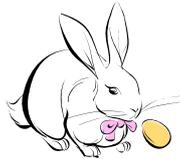




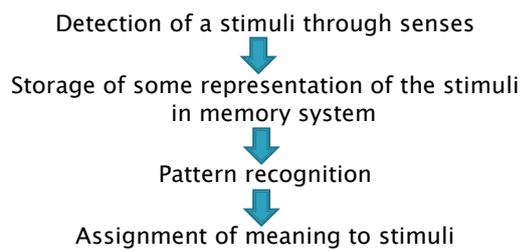


PERCEPTION

- ▶ The assignment of meaning to incoming stimuli
 - Is the detection of incoming stimuli by your senses
 - Is the process by which stimuli are perceived, recognised and understood



Steps of perception





Diameter
10 cm

Example: steps of perception

Detection of a stimuli through senses: stimulus may be seen/heard



Storage of some representation of the stimuli in memory system: stored these into icon/echo



Pattern recognition: circle/writing/sound information from LTM used to recognise pattern



Assignment of meaning to stimuli: select information to assign meaning that is undertaken in working memory

PERCEPTION IS AFFECTED BY

- ▶ Nature of stimulus (context of stimulus)
- ▶ Background of knowledge

- ▶ Pattern recognition occurs when elements match!!

Pattern recognition

- ▶ Prior knowledge used to make decisions about the meaning of the stimuli
- ▶ When stimuli in the environment are recognised as something stored in memory
- ▶ Two systems for recognising patterns:
 - Parts to whole (Example?)
 - Whole to parts (Example?)

Theory of pattern recognition (?!?!?)
Gestalt theory (PLEASE SEARCH)

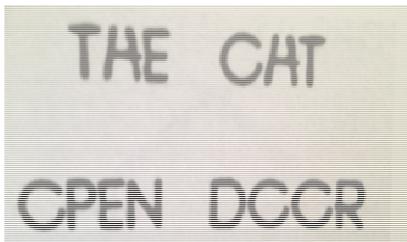
PRIOR KNOWLEDGE

- ▶ Directly affects perception process
- ▶ Allows perception occurs
- ▶ Guides perception of new information

CONTEXT

- ▶ influences perception
- ▶ May effect if certain features are perceived at all

EXAMPLE OF CONTEXT



DISCUSS OTHER EXAMPLES OF
CONTEXT INFLUENCE PERCEPTION



Educational Implication

- ▶ Context in part depends on external environment which the teacher can manipulate
 - Giving directive instructions
- ▶ Because pattern recognition is influenced by context, students need to be exposed to different contexts (academic & material) so that they learn how to differentiate them
- ▶ Prior knowledge guide perception
 - Activating prior knowledge
- ▶ Perceptions build up their knowledge stored in LTM – prior knowledge for following learning

PLEASE TRY TO PAY
ATTENTION ON THE
IMPLICATIONS OF PERCEPTION
ON MATHEMATICS LEARNING!

ATTENTION

Allocation of cognitive resources to a task

Critical for learning – to process information
learners have to pay attention

BUT

Human's have extremely limited processing
capacity!

Tepung	Peterseli	Ketumbar
Soda	Lada	Mentega
Saus cabe	Kue	Sirup
Kentang	Matonnaise	Bawang
Burger	Apel	Tomat
Susu	Oregano	Selada
Saos tomat	Telur	Baking soda
Sari jeruk	Spaghetti	Garam
Hot dogs	Merica	Meises
Cambah	Roti	Sukade

Limitations

- ▶ Generally people cannot attend to more a few things at once
- ▶ Under many conditions multi-tasking is not very effective because attention is divided too much, leading to poor executions of tasks (**divided attention**)
- ▶ Automation of skills can compesate for limited attention capacity

Attention Allocation

- ▶ The type of **TASK** influences attention allocation
 - Nature of task
 - Nature of need
 - Motivations
- ▶ Attention is allocated differently according to the tasks provided

RESOURCE LIMITED

A task where performance will improve if more attention is shifted to that task

*CONCENTRATION

DATA-LIMITED

Performance is limited by the quality of the presented task

Some tasks are so complex that some individuals can never apply enough resources to them because of lack of knowledge

Attention processing



Controlled

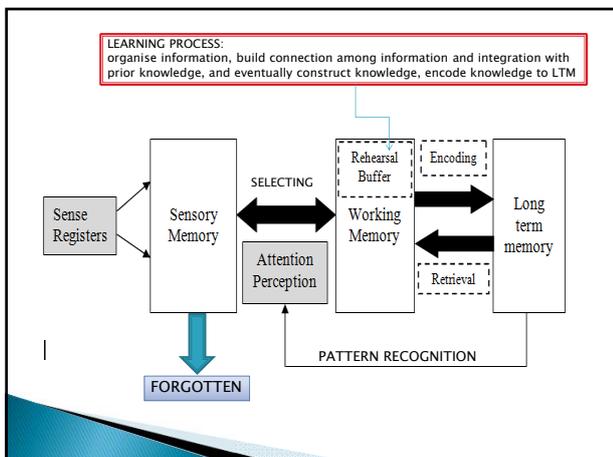
Automatic

AUTOMATED PROCESSING

- ▶ Occurs without intension and conciousness
- ▶ Less cognitive effort
- ▶ Less error
- ▶ Performance is quicker
- ▶ Automated performance
- ▶ Develop learning – to more difficult task
- ▶ Skilled learners

DISTRACTIONS

- ▶ Students are easily distracted
 - Teacher is giving important explanations, students mind starts to 'wander' –tuning in to other conversations (sounds), looking out the window (visuals), thinking of other matters (internal cognition)....etc
 - Concentration is **dependant** on attention



PAUSE

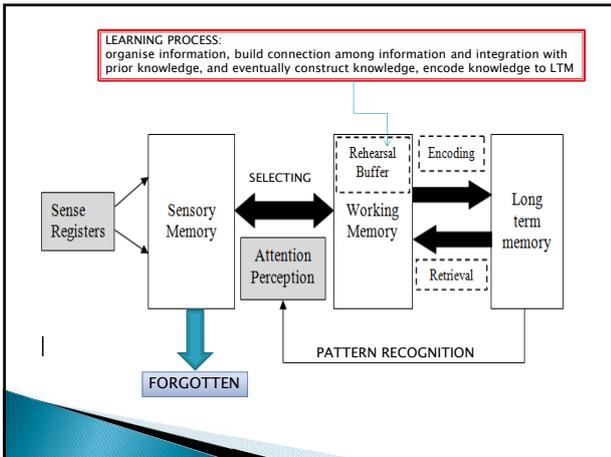
REHEARSE

WORKING MEMORY

- ▶ Where is it?
- ▶ Limited in capacity and duration!
- ▶ How we learn new task?
- ▶ How we learn difficult task?
- ▶ What is the role of automated prior knowledge from LTM
- ▶ What is the educational implication?
- ▶ What is the strategy to improve processing information in WM?

LONG TERM MEMORY

- ▶ Where Prior knowledge is stored
- ▶ How do we store first time ever "new knowledge"
- ▶ In what form (structure) knowledge is stored in LTM?
- ▶ How we recall knowledge in LTM
 - Automated vs controlled
- ▶ Types of knowledge
- ▶ Schema and the role of chunking information



YOUR ATTENTION PLEASE!!!

A silhouette of a person with their arms raised in a 'V' shape, standing on a light-colored surface against a dark background.
