

Cognitive Neuroscience and Learning

MUADP-4_Level 1 (2024)



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Learning

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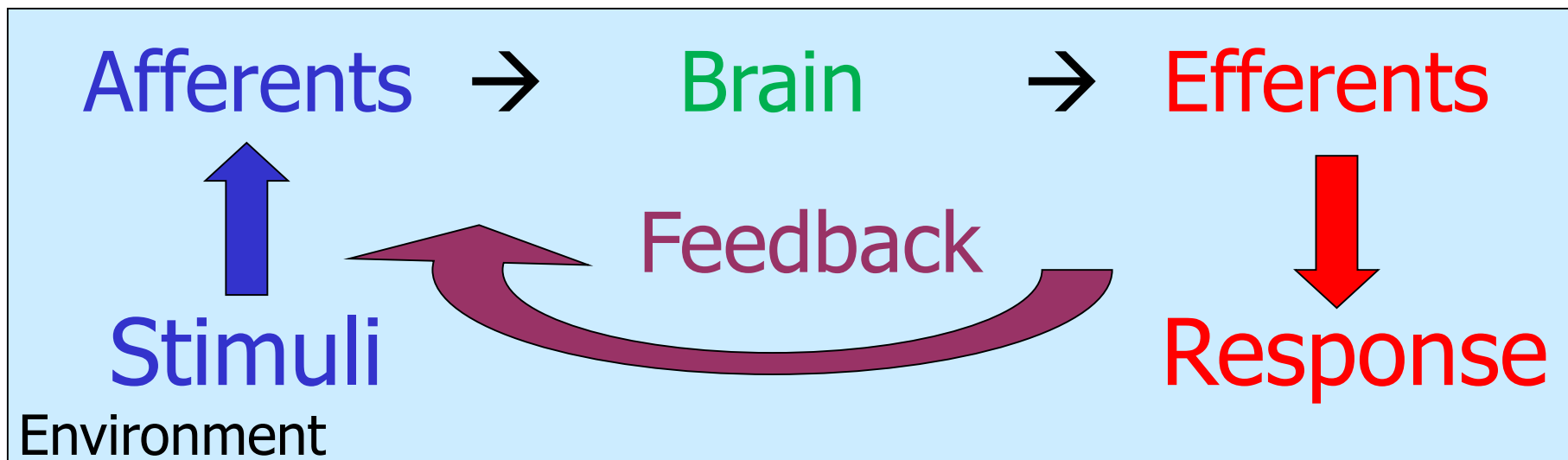
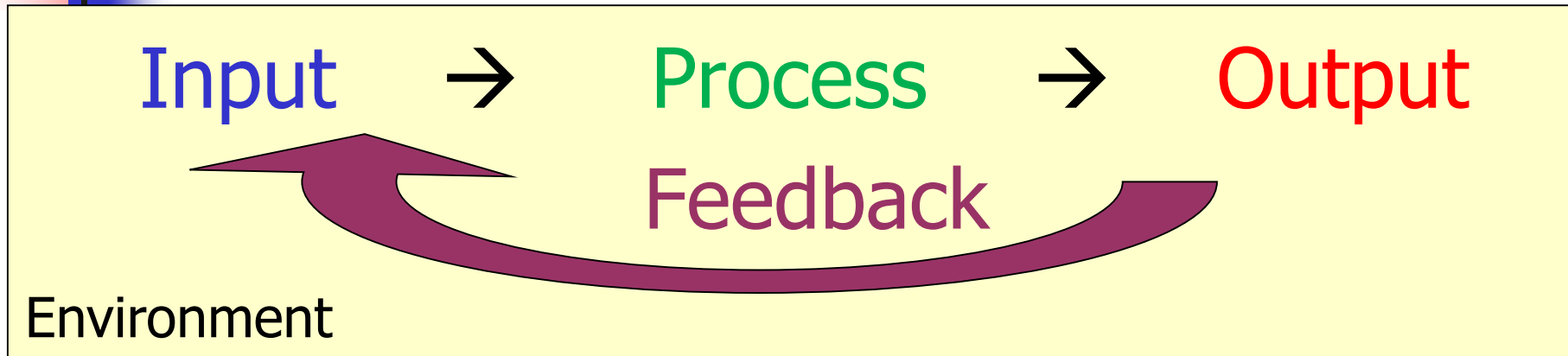


Topics...

Be able to explain and apply

1. System Concept & Physiology
2. What is Education & Education Concept?
3. Learning Styles
4. Brain & Learning
5. Brain-Based Learning
6. Cognitive Neuroscience
7. Learning & Memory
8. How to develop teaching media?

1. System Concept & Physiology

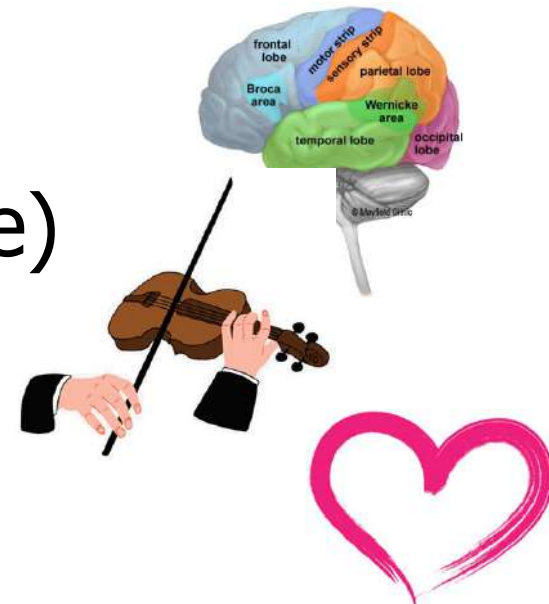


Education Concept (OLE & CPA)

1. **O**bjective: **L**earning **O**utcome
2. **L**earning process: Teaching & Learning
3. **E**valuation: Formative, Summative

Revised Bloom's Taxonomy

1. **C**ognitive Domain (**K**nowledge)
2. **P**sychomotor Domain (**S**kill)
3. **A**ffective Domain (**A**ttitude)



Head : Cognition

Bloom's Taxonomy

สร้างสรรค์

ประเมินผล

วิเคราะห์

ใช้

เข้าใจ

จำ

create

Produce new or original work

Design, assemble, construct, conjecture, develop, formulate, author, investigate

evaluate

Justify a stand or decision

appraise, argue, defend, judge, select, support, value, critique, weigh

analyze

Draw connections among ideas

differentiate, organize, relate, compare, contrast, distinguish, examine, experiment, question, test

applying for

Use information in new situations

execute, implement, solve, use, demonstrate, interpret, operate, schedule, sketch

understand

Explain ideas or concepts

classify, describe, discuss, explain, identify, locate, recognize, report, select, translate

remember

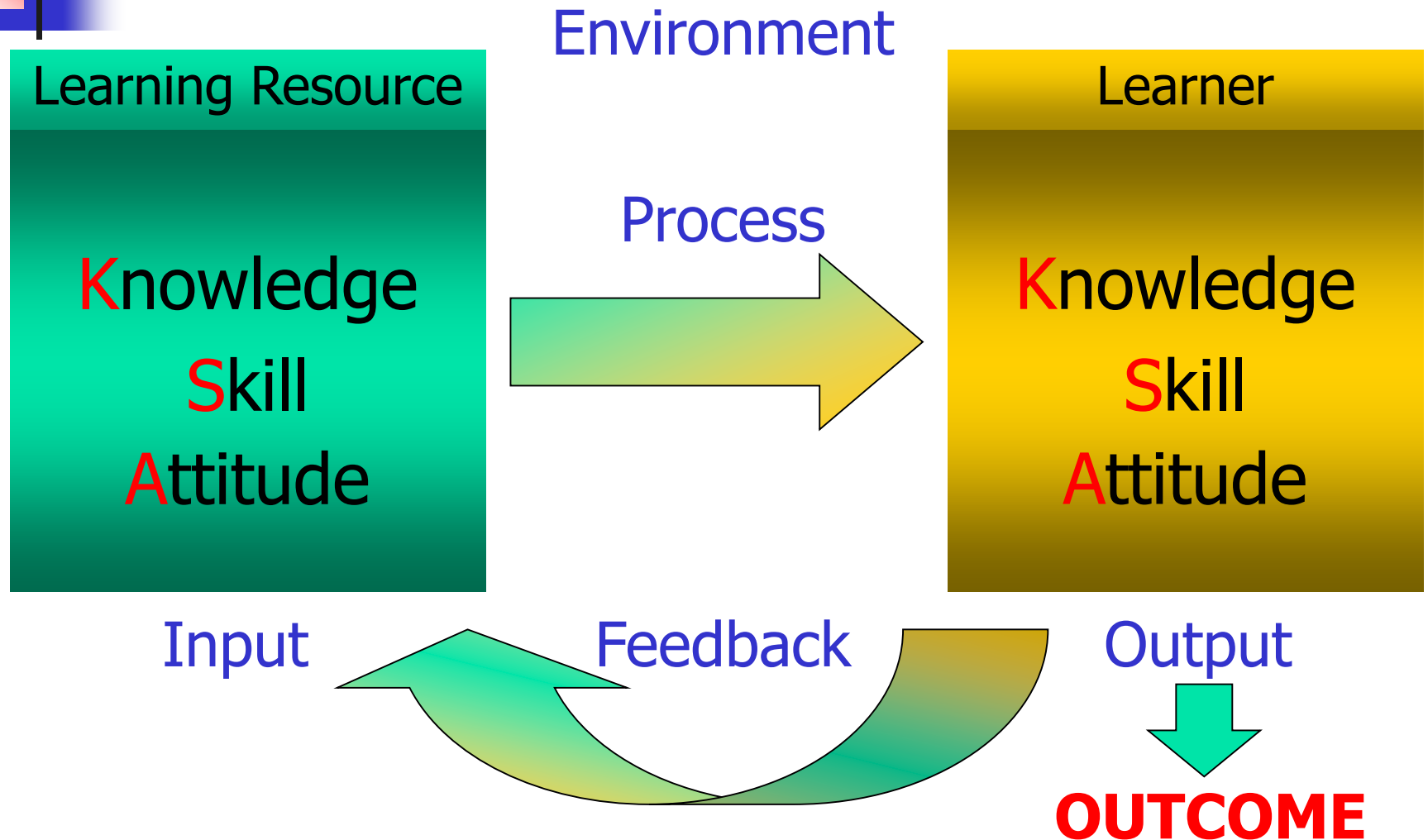
Recall facts and basic concepts

define, duplicate, list, memorize, repeat, state



Vanderbilt University Center for Teaching

Teaching & Learning Components





3. Learning Styles

- Style of learning based on each individual preference
- Learning Styles
 - Perceptual Modality / **VARK** Learning Style

Practice 1

- <https://vark-learn.com/the-vark-questionnaire/>





Perceptual Modality

- Input modality/channel
- VARK Learning Style
 1. **V**isual learning style
 2. **A**uditory learning style
 3. **R**ead/Write learning style
 4. **K**inesthetic & Tactile learning style



Perceptual Modality (2)

- Dominant 1-2 learning modalities
- Process unconsciously
- May consciously aware of preferred modes
- Access through all senses,
but generally favor 1 or 2



3.1 Visual Learning Style

- Input
 - Shape or form oriented
 - prefer seeing pictures, images, diagrams, map
 - when listening: create a mental picture
- Output
 - like drawing, showing pictures, ...
 - I see that...
- Character
 - Eagle's eyes, Bird's eyes view
 - Parallel processing



3.2 Auditory Learning Style

- Input: Listener & Conversation
 - Prefer spoken messages
 - Remember things said to them
 - Carry on mental dialogues
- Output: Interactive
 - Talk it out & Need to hear their own voice to process the information
 - I hear that...
- Character
 - Sequential processing



3.3 Read/Write Learning Style

- Input:
 - Prefer reading text
 - Happy to have detailed manual, textbook, document, handout
- Output:
 - Prefer writing text, note, journal, diary
 - I used to read about...
- Character
 - eBook worm

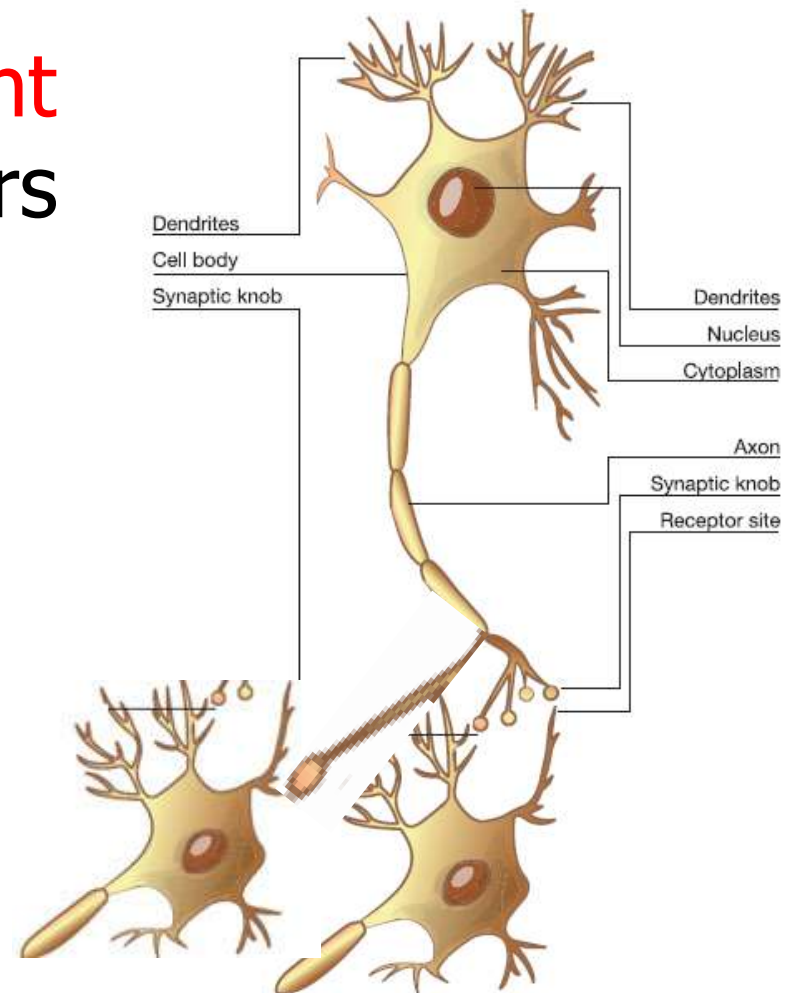


3.4 Kinesthetic Learning Style

- Input
 - Tactile learners want to touch
- Output
 - Kinesthetic through muscle, joint, tendon
 - Want to sense the position and movement
 - Enough talking and looking, let's do it.
- Character
 - Prefer activities moving around
 - trials and errors, simulation, VR

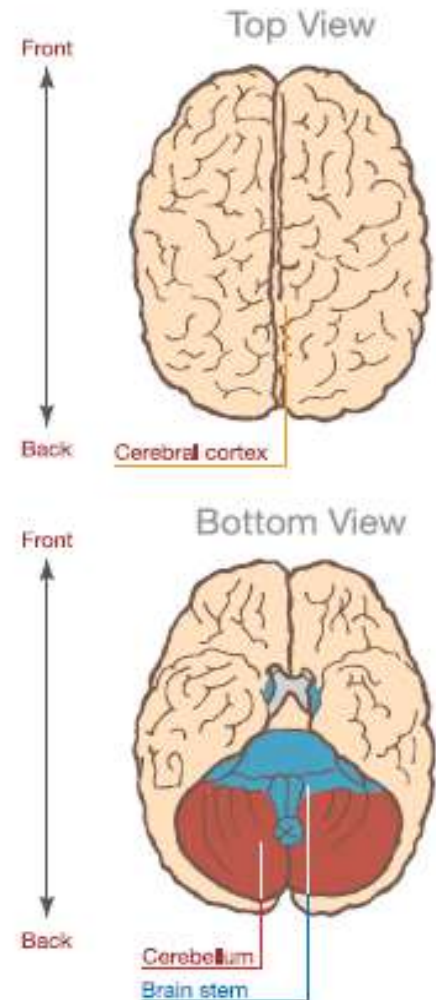
4. Brain & Learning

- **Learning by engagement**
→ increased nerve fibers
& synapses
- **The more the brain is used,** the more fiber branches and synapses are formed



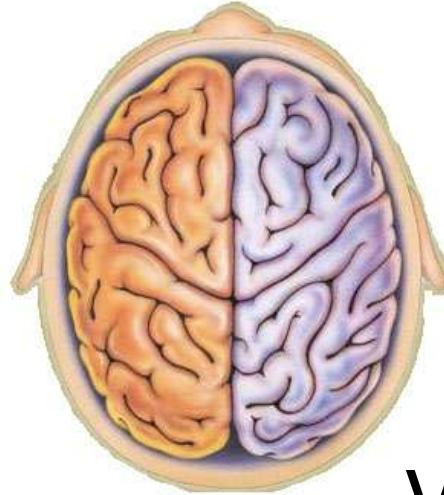
4. Brain & Learning (2)

- **Interest & Emotion**
- Relaxed alertness
- Relevant to real life experience
- Learning through experience & practice
- **Brain lateralization**
 - **Dominance**
- Left & Right brains





Left



Right

- Details
- Temporal: Time-series
- Sequential
- Logical
- Mathematics & Language
- Scientific
- Analytic
- Visuo-spatial
- Spatial: 3D
- Parallel
- Feel like...
- Music & Art
- Imaginative
- Synthetic, Creative



5. Brain-Based Learning

<https://il.mahidol.ac.th>

5.1 Physiology of Learning

5.2 Psychology of Learning



5.1 Physiology of Learning

- * Healthy Brain:
 - Food/Water, Air, Exercise, Rest, Emotion
 - Consciousness, Subconscious learning
 - Sensory Perceptions: 5 senses
 - Motor/Exercise, Rhythmic movement
 - **Repetition** & **application** are the keys
 - Thinking
 - Meditation → Status of brain waves
 - Feeling & Emotion



5.2 Psychology of Learning

- Feeling and Emotion
 - Love / Hatred
 - Happiness, Peacefulness / Anger, Sadness, Anxiety
 - Curiosity, Fun, Challenge / Boredom
- Relaxation / Stress, Threat
- Reward / Punishment
- Attention, Inspiration
- Passion & Perseverance



6. Cognitive Neuroscience

- Neurophysiology
 - Mechanism of learning and memory
- Neurobehavior science
 - Behavior and expression
- Psychology of learning
 - Education Concept



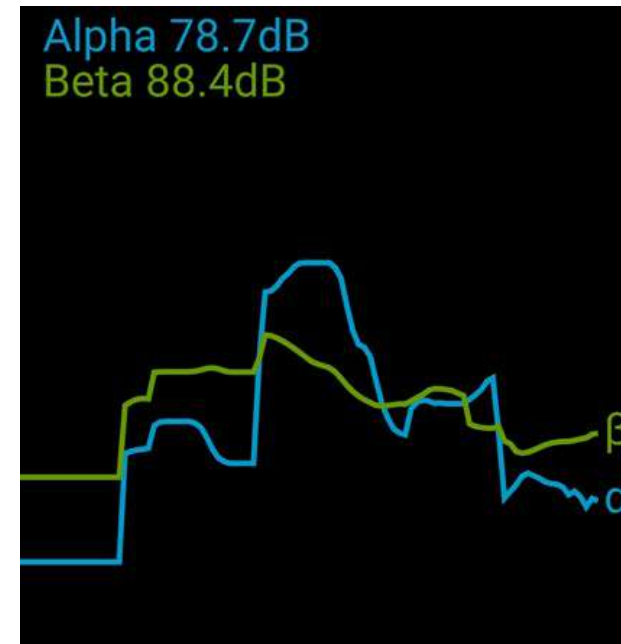
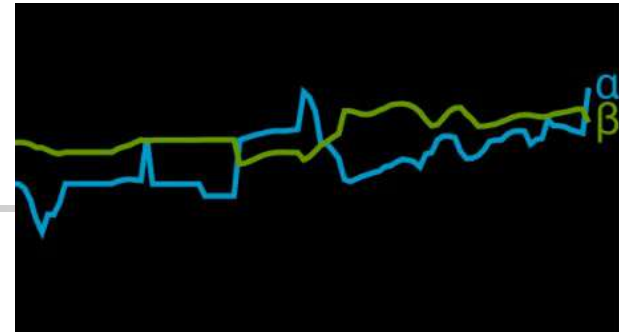
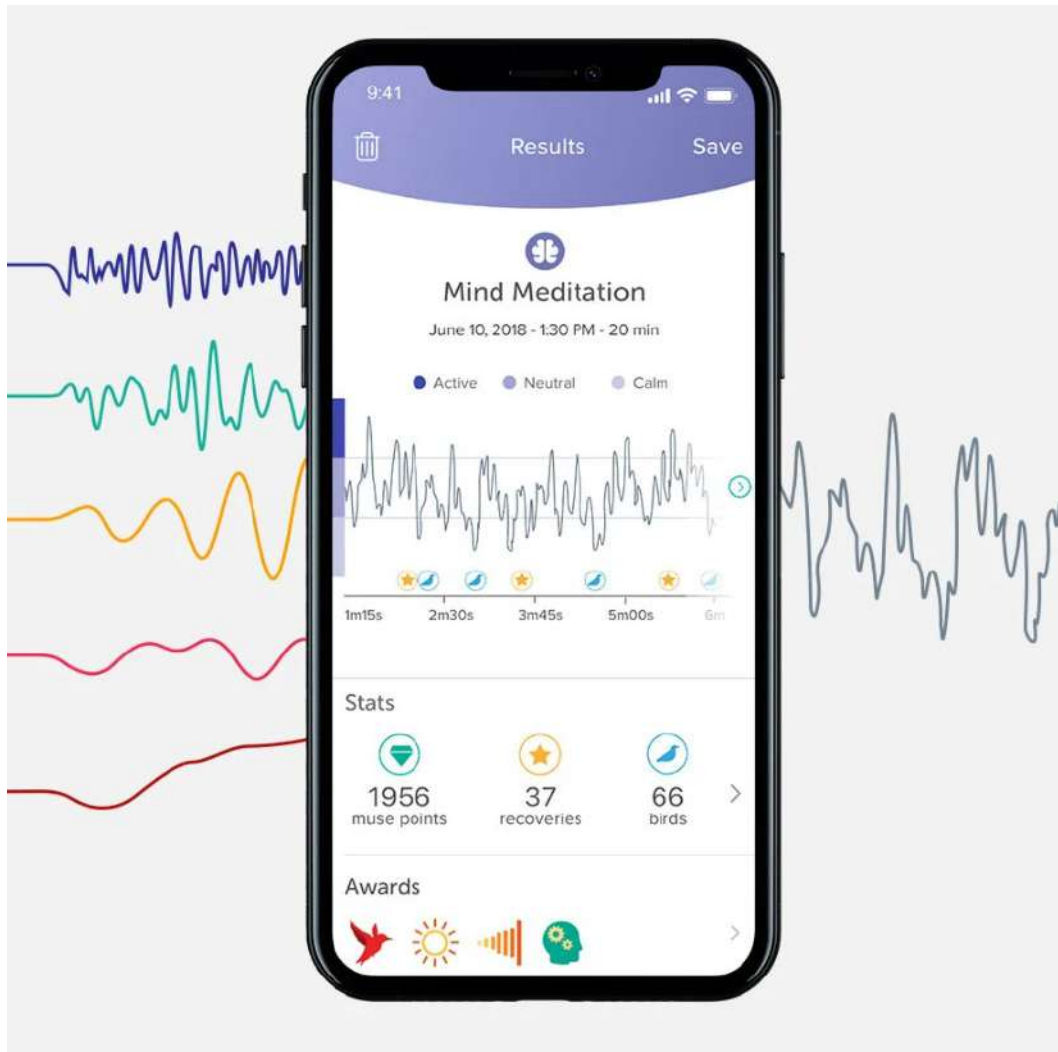
6. Cognitive Neuroscience (2)

- Input : Perception →
Electroencephalogram (EEG) ,vERP, aERP
 - Vision, Hearing
- Process:
 - Language, Pre-attention, Attention
- Output:
 - Motor control & expression, navigation
 - Learning and Memory

MUSE: Brain Sensing Headband

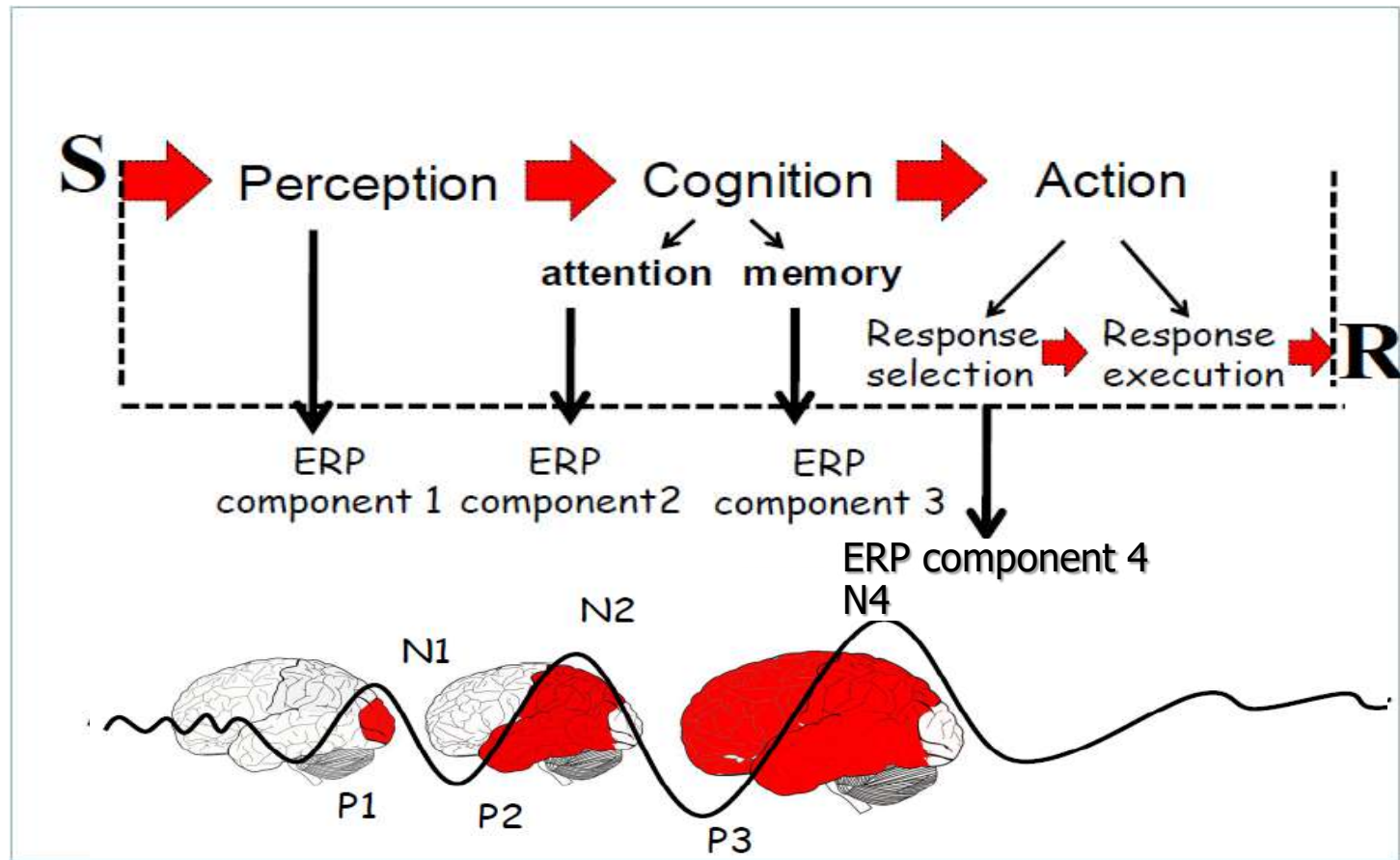


<https://choosemuse.com/>



Electroencephalogram (EEG): Alpha & Beta

visual Event-Related Potential



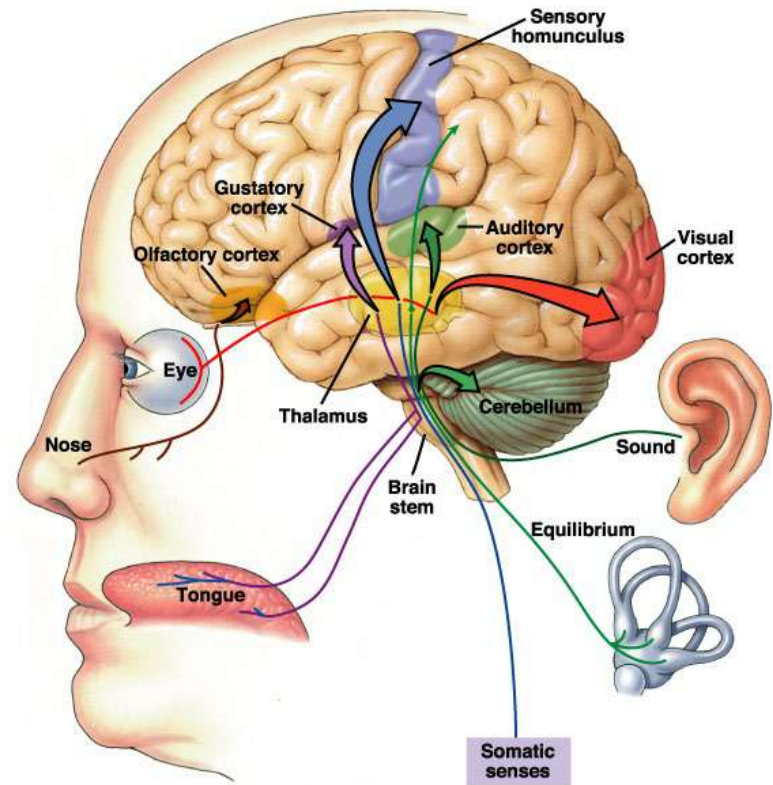


6. Cognitive Neuroscience (3)

- Study the factors influencing learning and memory
- Apply Education Concept and ICT to enhance learning & memory

7. Learning & Memory

- Stimuli
→ Sensory perception
- Physiology & Psychology of Learning
- **Repeat** at the right time
- **Apply** all the time
- **Practices** make perfect



Practice 2: Which one is better for learning?

A



Apple

B



Apple

C



Apple

D

Apple





Confucious

I hear, and I forget;

I see, and I remember;

I *do*, and I understand.

มหาวิทยาลัยมหิดล
สถาบันเวชระเบียน

โครงการอบรมเชิงปฏิบัติการ เรื่อง การใช้

Short Course

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2,500.-

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ณ โรงแรม S31 สุขุมวิท สุขุมวิท 31 กรุงเทพมหานคร

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ศ. ดร.นายแพทย์ชัยเลิศ พิชิตพรชัย






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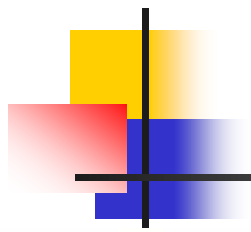
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วิทยากร
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สถาบันเวชกรรมการเรียนรู้

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โรงแรม S31 กรุงเทพ สุขุมวิท 31
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เคล็ดลับการอ่านเร็วและเพิ่มพลังความทรงจำขั้นสูง
Speed Reading Secrets & Advanced Memory Power

อ่านเร็วเพิ่มขึ้น > 3 เท่า
จำแม่น-จำนานอย่างเหลือเชื่อ

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<https://il.mahidol.ac.th/th/>

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About the speaker



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