APSES
2017-2019
2017-1-LV01-KA204-035487
Co-funded by the Erasmus+ Programme of the European Union

Cognitive process

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Cognitive *process:*

I Sensual level

II Generalized level
(only for humans)

1. Senses

2. Perceptions

3. Attention

4. Memory

5.Thinking

6. Imagination

7. The speech

Check

1. Senses

- The result of interaction between human (senses) and the external world

Interoceptive

Organic

-Comes from the stomach, heart,

- Feeling that you become ill (pain)

Proprioceptive

Non-traditional sense

Body position in the room

- Balance and acceleration
- Temperature
- Proprioception

Eksteroceptive

Traditional senses

From the outer world

Contact senses:

Taste

Touch

Distance senses:

Sight

Hearing

Smell

2. Perception

- represents the case as a single whole

Perception - is the organization, identification, and interpretation of sensory information in order to represent and understand the presented information

Time perception

1. Physical time
2. Biological time
3. Subjective Psychic Times

Perception of **space**

The awareness of the **position, size, form, distance**, and direction of an object, or of oneself

Motion perception

Motion perception is the process of **inferring the speed and direction** of elements in a scene based on visual, vestibular and proprioceptive inputs.

3. Attention

- the ability to keep the mind on something;
- the ability to concentrate

Accidental attention

Calls -external irritants

Is unsustainable - *does not use willpower*

Intentional attention

Calls - target *(own or other)*

Keep attention - the effort of will

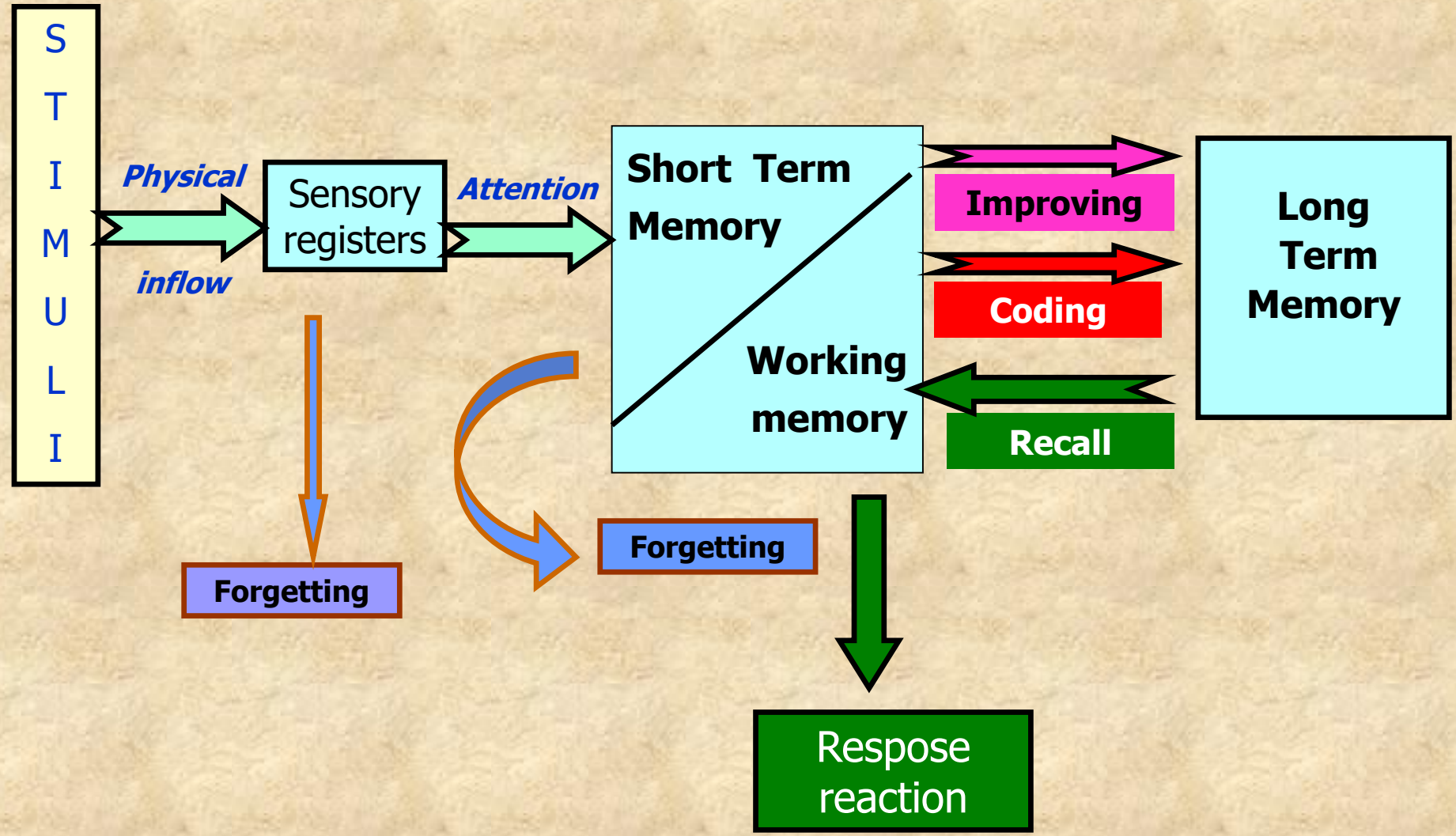
Post Intentional attention

Calls - target *(own or other)*

Keep attention - the interest get in the work process

4. Memory

Information Processing Model

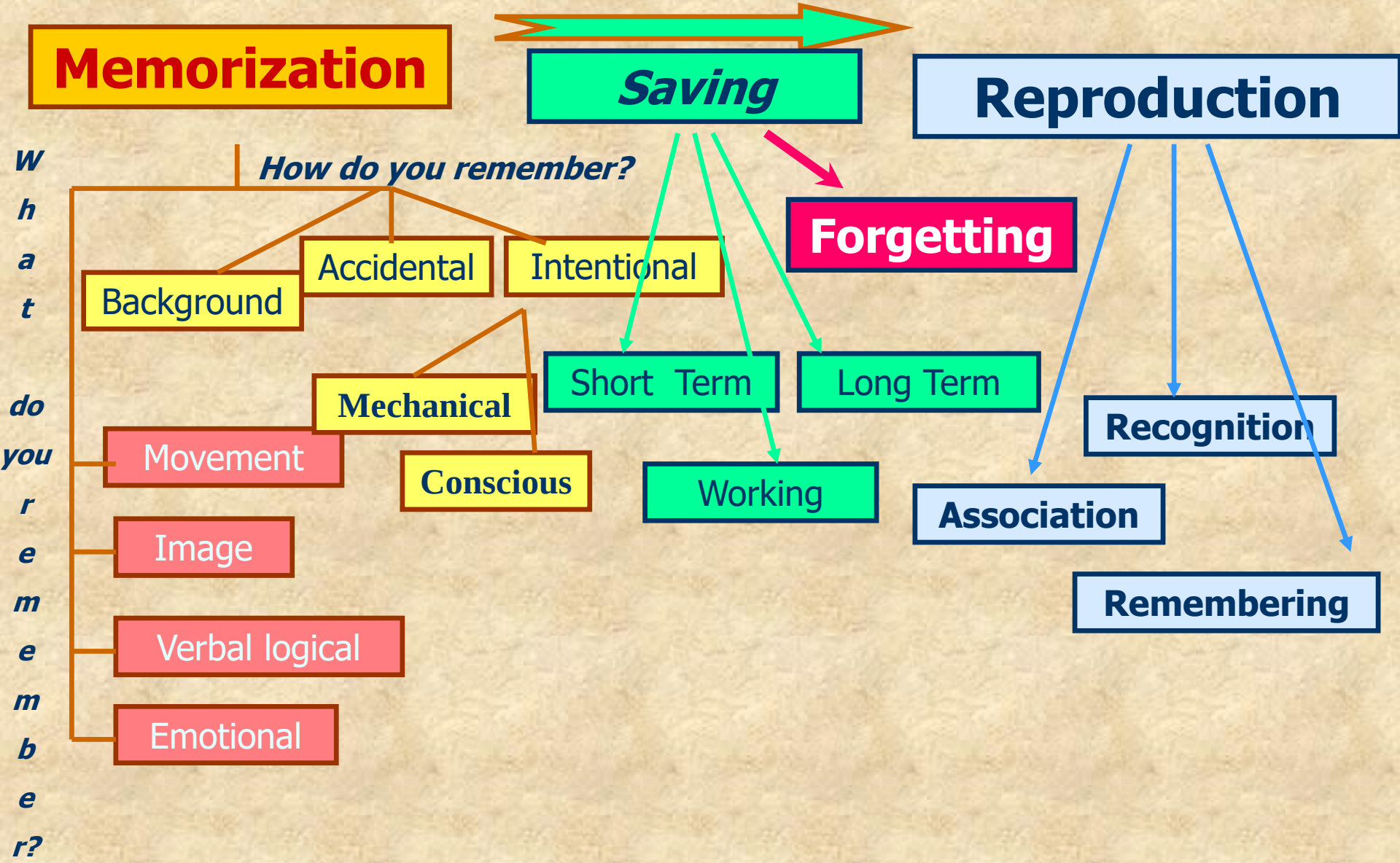


Based on Traditional Model of Memory

Atkinson &Shiffrin (1968) Three Stage Model

4. Memory

Improve and code information



Memorization

How do you remember ?

Background

You memorize background elements intentionally and unrecognized

Accidental

does not target
the attention is concentrated

Accidental better remember:

- What connect to personality;
- The beginning and end ;
- Discontinued operations;
- What she/he was doing, not thinking

- **Ineffective** due to the increasing "braking«:

- **Better than nothing**

Intentional

Should target
The attention isdeliberately focused

Conscious

Mechanical

Without awareness repeatedly reading through the material

Reading

1 time – remembers around 7 elements

16 times – remembers around 12 elements

30 times– remembers around 16 elements

Conscious Memorization

Improve and code information

Recommendations:

1) See **relatinalships** between the memorable material

2) **Intellectual processing** of the material to remember:

* **Conceptual** grouping *(distributing to micro subjects)*

* Finding **basic concepts**

* Grouping **by analogy**

* Grouping by **causality**

3) «swich» the memory for **longer time**

Improve and code information

Cognitive active learning

* ***Highlight*** *certain places*

* ***Let's stop,*** *ask yourself: "what's meant for?"*

* *To* ***understand meaning*** *from symbolic systems - words, numbers, pictures*

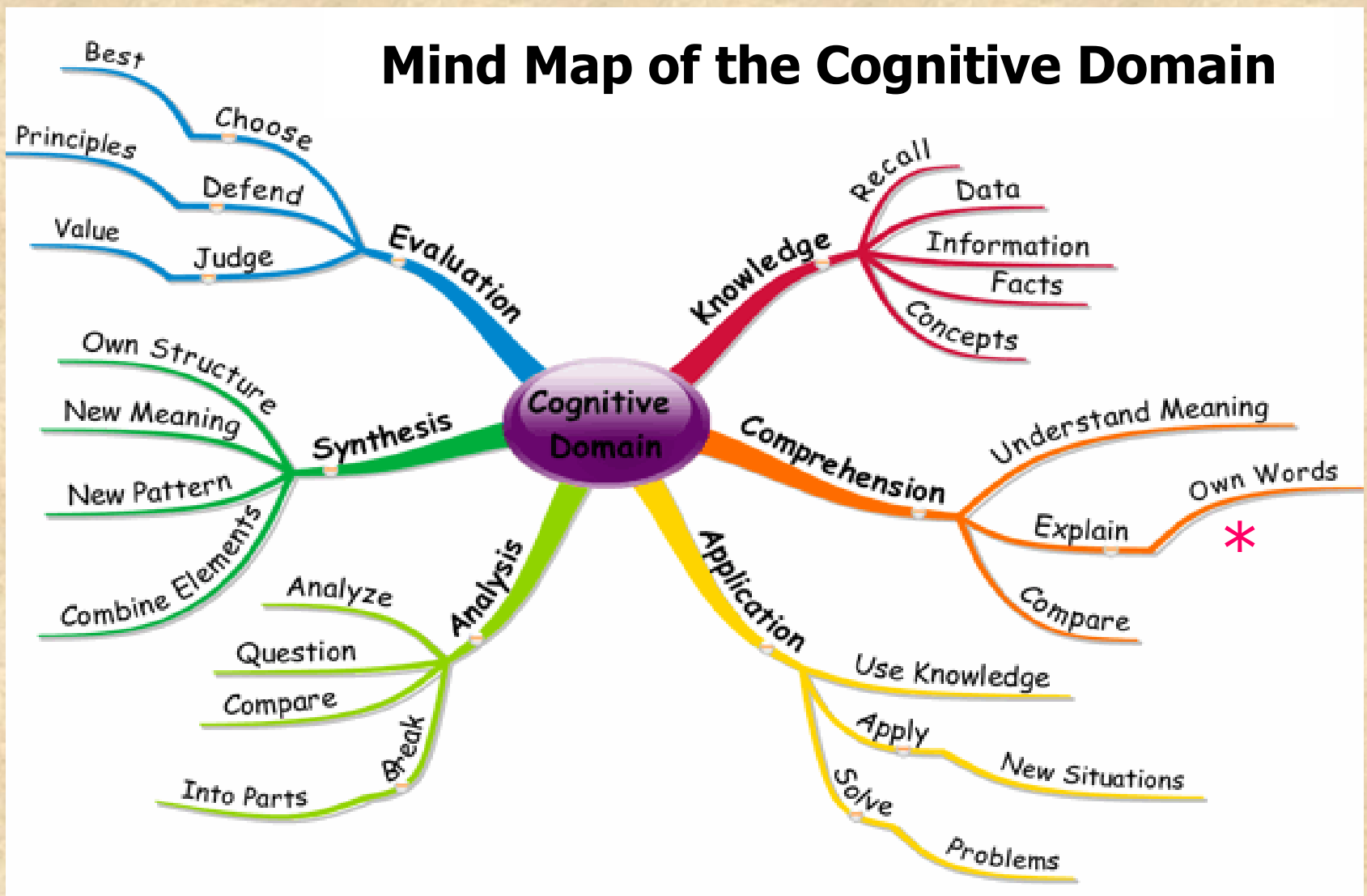
* *Find* ***key words***

Michael Jordan is the most famous basketball plyer. He scored many points and earns the most money for his efforts "

Michael Jordan = many point + many money

Improve and code information

Grafic organization

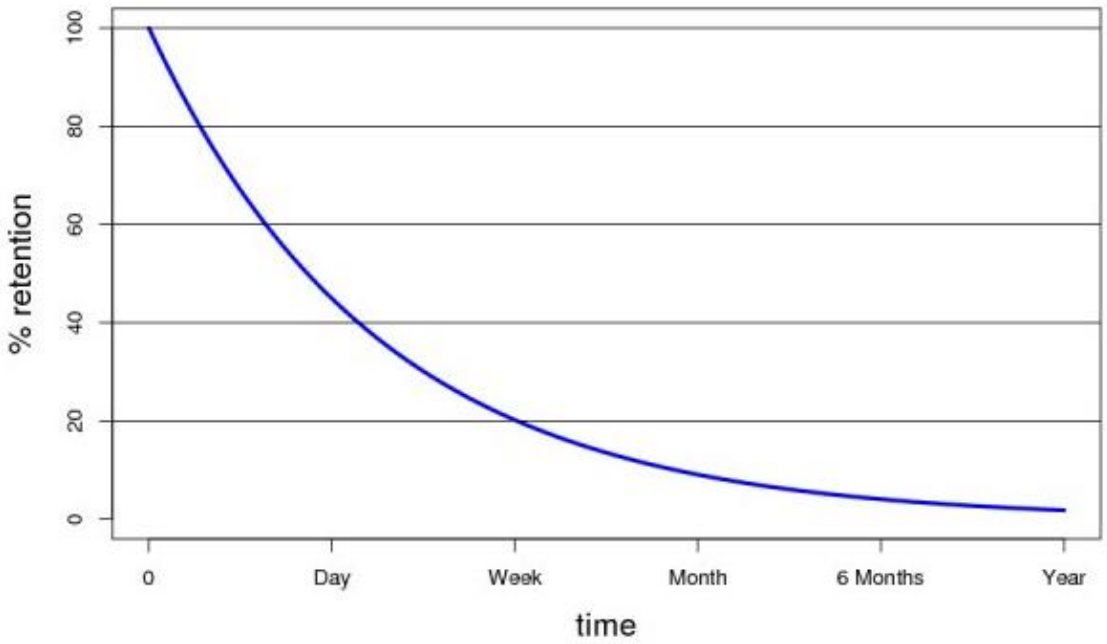


Forgetting

- Memory disposes of what it is "**not needed**"

- Memory disposes of what "**interferes**"

Forgetting curve



Reproduction

Association

Accidental conceived is included in our experience system and at some point it is recognizable

Recognition

What we perceive at the same time, we recall at the same time

Remembering

An intellectual activity that train itself

5.Thinking

Thinking process stages

Analysis

Devide an object into separate sections

Abstraction

Emphasize some important characteristics

Comparison

Must have a **single basis** for comparison

Synthesis

Connection of parts

Thinking **DEVELOPMENT** levels

I An active thinking

Result- new object

II Specific imaginative thinking

Result – new image

III Verbal logical thinking

Result – a new concept

Levels of thinking **depth**

I What happens and how?

II Why?

III What does it make sense?

6. Imagination

Types of Imagination

Accidental

New images arise without special intent

Intentional

Reproductive

Image creatingg to the pattern word description

Creative

Creating new, original images

Active

Dreams

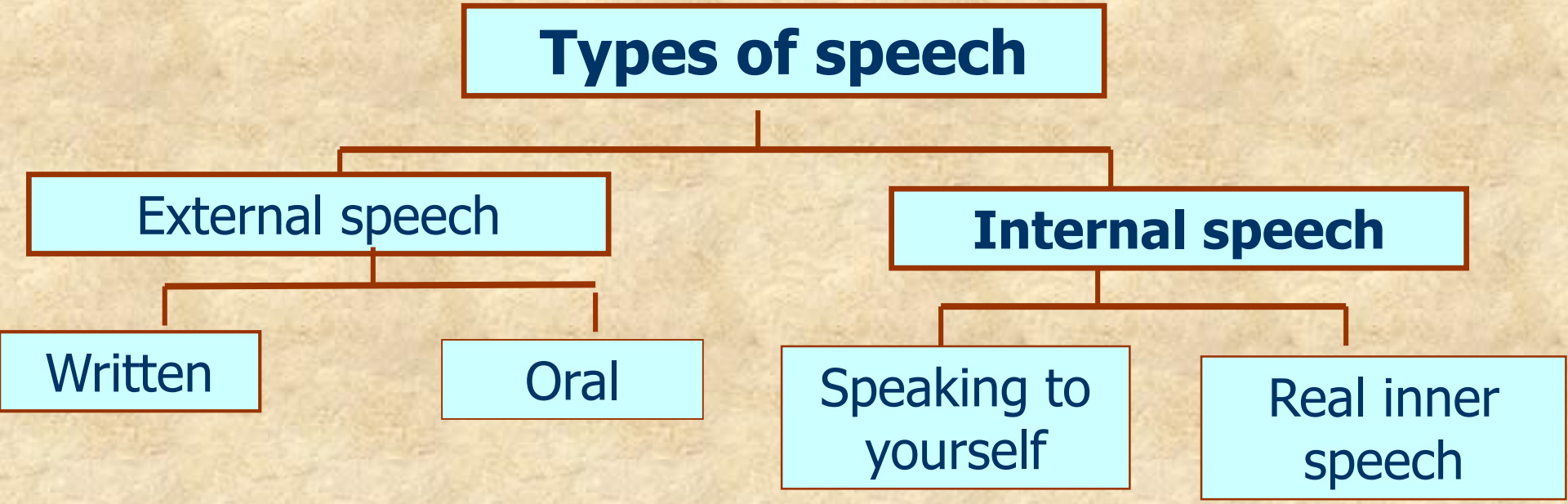
Active
- building the future of realistic dreams

Passive

Reverie

Passive
- a future image that does not match

7. The speech



Language

– any sign system

-a component of the thinking mechanism

Language functions:

1. The tool for creation the thought
2. The representation the idea
3. Communicative-exchange of information
4. Cognitive – foreign words, scientific language

Cognitive Barriers

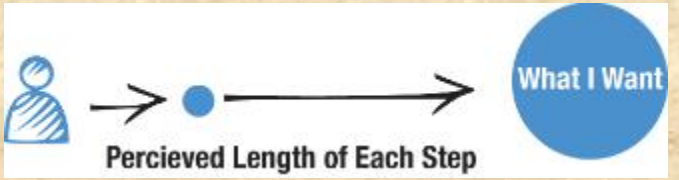
Number of steps

- *it's equally important to know when **to add steps** as it is when to **remove** them.*

Five easy, short steps often impose a lower cognitive barrier than one long, difficult step.

Length of steps

*Users tend to prefer **short steps** that only ask them to resolve the immediate issue they're faced with.*



Difficulty of steps

Don't create unnecessarily difficult steps

users will be more likely to complete difficult steps if they understand why the step needs to be so difficult.

Barriers to Critical Thinking

Five ***Powerful Barriers*** to Critical Thinking:

Egocentrism

Self-centered thinking
- *self-interested thinking*
- *self-serving bias*

Sociocentrism

Group-centered thinking
- *Group bias*
- *Conformism*

Unwarranted Assumptions

Beliefs that are presumed to be true without adequate evidence or justification
- *Assumption*
- *Stereotyping*

Wishful Thinking

Believing that something is true because one wishes it were true.

Relativistic Thinking

The truth is "just a matter of opinion"
- *Relativism*
  - ❑ *Subjectivism*
  - ❑ *Cultural relativism*

Problem solving strategies - 1

Abstraction: *solving the problem* ***in a model*** *of the system before applying it to the real system*

Analogy: *using a solution that solves an analogous problem*

Brainstorming: *(especially among groups of people) suggesting a large number of solutions or ideas and combining and developing them until an optimum solution is found*

Divide and conquer*: breaking down a large, complex problem into smaller, solvable problems*

Hypothesis testing*: assuming a possible explanation to the problem and trying to prove (or, in some contexts, disprove) the assumption*

Lateral thinking*: approaching solutions indirectly and creatively*

Means-ends analysis*: choosing an action at each step to move closer to the goal*

Method of focal objects*: synthesizing seemingly non-matching characteristics of different objects into something new*

Problem solving strategies - 2

Morphological analysis: *assessing the output and interactions of an entire system*

Proof*: try to prove that the problem cannot be solved. The point where the proof fails will be the starting point for solving it*

Reduction: *transforming the problem into another problem for which solutions exist*

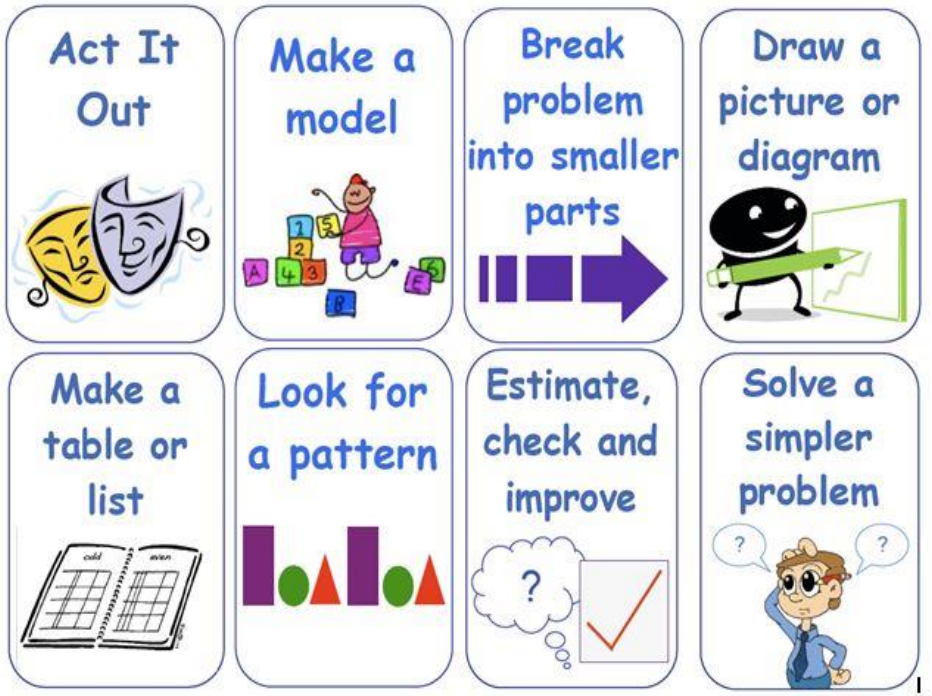
Research: employing existing ideas or adapting existing solutions to similar problems

Root cause analysis: *identifying the cause of a problem*

Trial-and-error: *testing possible solutions until the right one is found*

Problem solving strategies!

- Act it out
- Draw a picture
- Solve a Simpler Problem
- Use Logical Reasoning
- Work Backward
- Write an Equation
- Write a Number Sentence
- Make an Organized List
- Make a Table / Chart / T-Chart
- Use Estimation
- Use Mental Math
- Make a Number Line
- Find a pattern
- Guess and Check



Steps	Example Tools	
Understand the Process	Flowchart	
Collect data on key input, process, and output measures	Checksheet Data sheet Survey	
Analyze process stability	Run chart (time plot) Control chart	
Eliminate special cause variation	See Problem Solving Strategy	
Evaluate process capability	Histogram Standards Capability analysis	
Analyze common-cause variation	Pareto chart Statistical inference Stratification	
Study cause&effect relationships	Cause&effect diagram Experimental design Interrelationship digraph	Model building Scatter plot Box plot
Plan and implement changes		

WHAT	• What (exactly) do I want to achieve? • What are the facts? • What would happen if no decision was made or solution found? • What do I need in order to find a solution?
WHY	• Why do I want to achieve a solution? • Why did the problem or opportunity arise? • Why do I need to find a solution or way forward at all? • Ask 5 Whys
HOW	• How will the situation be different? • How relevant is the information I am gathering? • How can I find out more? • How can I involve relevant people?
WHERE	• Where did the issue arise? • Where does it impact? • Is the "where" important? • If so, why?
WHO	• Who am I trying to please? • Who cares about this situation? Who is affected? • Who is involved (information, help, action)? • Who needs to be informed?
WHEN	• When did the issue arise? • When do we need to act? • By when must it be resolved?