

# Creative and Scientific Thinking

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CRE252

Information Technology Department

## Lecture 3



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# Learning Objectives:

- Three types of Scientific thinking
- Creative/Divergent Thinking Definition
- How to increase creativity?
- Some approaches involved in creative thinking skills
- Blocks to creativity
- Critical/Convergent Thinking Definition
- Lateral /Metacognition Thinking Definition
- Three types of Scientific thinking Steps

# Three types of Scientific thinking

## **Scientific Thinking:**

- 1. Creative/Divergent Thinking**
- 2. Critical/Convergent Thinking**
- 3. Lateral /Metacognitive (thinking about their thinking) thinking individual.**

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## 1. Creative/Divergent Thinking Definition



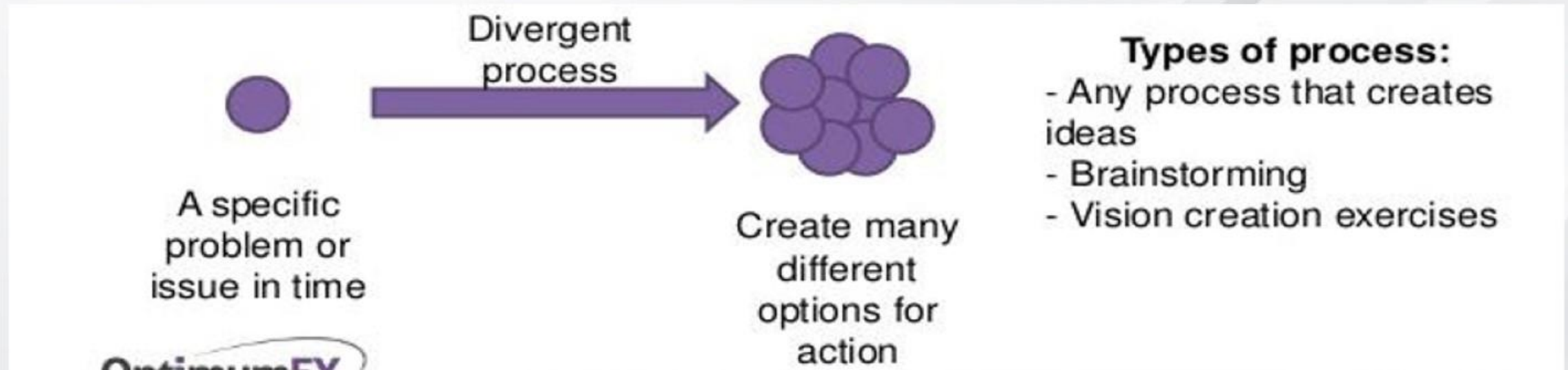
## 1. Creative/Divergent Thinking Definition:

- **Divergent Thinking** is a thought process or method used to generate creative ideas by exploring many possible solutions.
- **Divergent Thinking** typically occurs in a spontaneous, free-flowing, “non-linear” manner, such that many ideas are generated in an emergent cognitive fashion.

## 1. Creative/Divergent Thinking Definition:

- Many possible solutions are explored in a short amount of time, and unexpected connections are drawn.
- After the process of divergent thinking has been completed, ideas and information are organized and structured using convergent thinking.

# 1. Creative/Divergent Thinking Definition:



## Top Creative Thinking Skills

### ANALYTICAL

Ability to analyze things first



### OPEN-MINDED

Thinking of things no one else has considered before

### PROBLEM SOLVING

Ability to solve an important issue



### ORGANIZATION

Being able to structure a plan of action with clear goals and deadlines



### COMMUNICATION

Strong written and oral skills, ability to listen and ask the right questions



# The background of creative thinking?

**Creative thinking represent:**

- Open approach more than critical thinking.
- Less ordered, less structured, less predictable than critical thinking.

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## How to increase creativity?



## 1. Learn Through Curiosity حب إستطلاع فضول



- The human brain works magically when you **read enough** or **talk to enough experts**,
- When you **have enough inputs**, new ideas start appearing

## 2. Do Something You Love



- Do something that pleases you that is the way to learn the most
- When you are doing something with such enjoyment, you don't notice that the time passes.

### 3. have a hoppy

- **participate in a hobby**, such as playing an instrument, running, or collecting memorabilia تذکارات
- can **help you relax and fight stress** while giving your creativity a boost.



## 4. Ask For Advice or Feedback

- Asking for help isn't a sign of weakness.
- Ask for help and advice from friends
- Even if you don't use their advice, it may spark some new, creative thinking that will get you where you need to go.



# Some approaches involved in creative thinking skills

## Creative thinking skills involve such approaches as:

- Looking for many possible answers rather than one.
- Allowing yourself to make wild **جامع** suggestions as well as those that seem sensible.
- Not judging ideas early in the process.

## **Creative thinking skills involve such approaches as:**

- Treat all ideas as if they may contain the seeds of something potentially useful.
- Don't be afraid to make mistakes.
- Learning from what has not worked as well as what did.

Think about the following quotation from Edward de Bono – author of ‘Six Thinking Hats’ (1985). *“The need to be right all the time is the biggest bar to new ideas. It is better to have enough ideas for some of them to be wrong than to be always right by having no ideas”*

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## Blocks to creativity



## Blocks to creativity we may fear:

- Fear that you are not a creative person:
  - Solution Look around at the ways you overcome difficulties and see how creative you already are.
- Fear of failure:
  - Solution know that success is the process of exploring and learning.

## Blocks to creativity we may fear:

- **Exercise:**

- Try to remember a time when you were creative, what happened?
- How did you feel?



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## 2. Critical/Convergent Thinking Definition

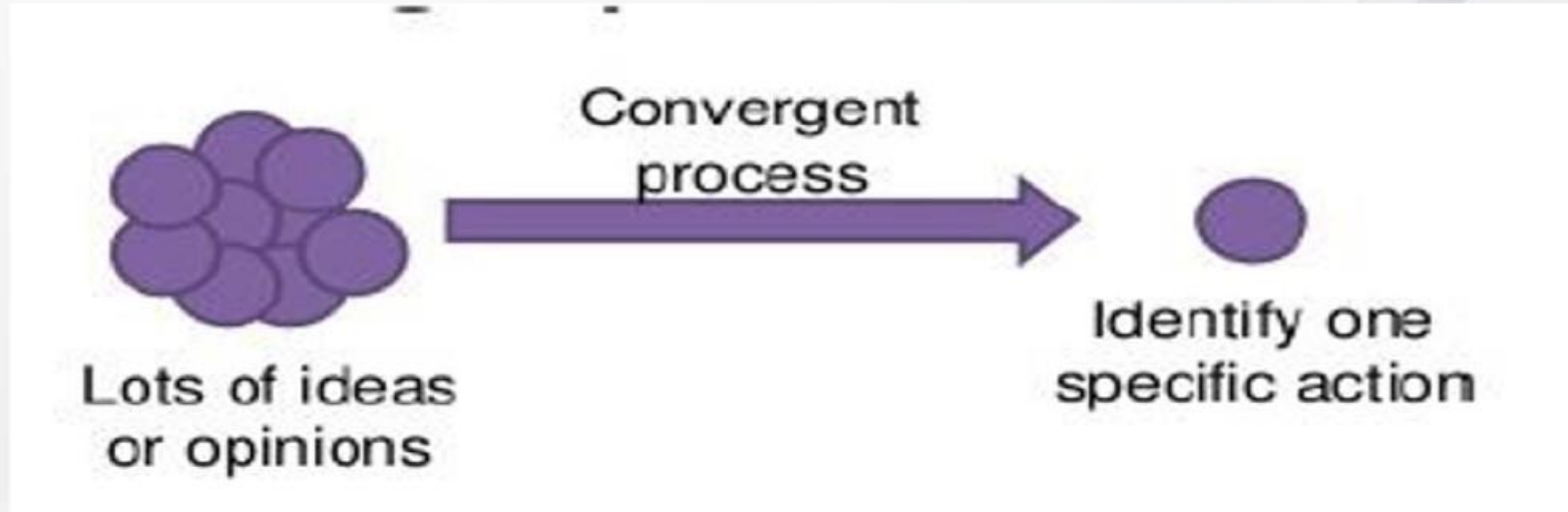


## 2. Critical/Convergent Thinking Definition:

**Convergent Thinking** is the process of finding a single best solution to a problem that you are trying to solve.

- Many tests that are used in schools, such as multiple choice tests, spelling tests, math quizzes, and standardized tests, are measured of Convergent Thinking.
- Traditional intelligent tests, such as the Stanford-Binet, also measure Convergent testing.

## 2. Critical/Convergent Thinking Definition:



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### 3. Lateral /Metacognition Thinking Definition



### 3. Lateral /Metacognition Thinking Definition:

- Lateral /Metacognition Thinking is solving problems through an indirect and creative approach.
- Lateral /Metacognition Thinking using reasoning that is not immediately obvious and involving ideas that may not be obtainable by using only traditional step-by-step logic.

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**1. Critical / Convergent Thinking Steps:**



# 1. Critical / Convergent Thinking Steps:

## 1. Critical / Convergent Thinking

1. Analyzing components and relationships in a system
2. Comparing and contrasting options
3. Making inferences and interpretations from data
4. Evaluating the relative worth of options

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## 2. Creative / Divergent Thinking Steps:



## 2. Creative / Divergent Thinking Steps

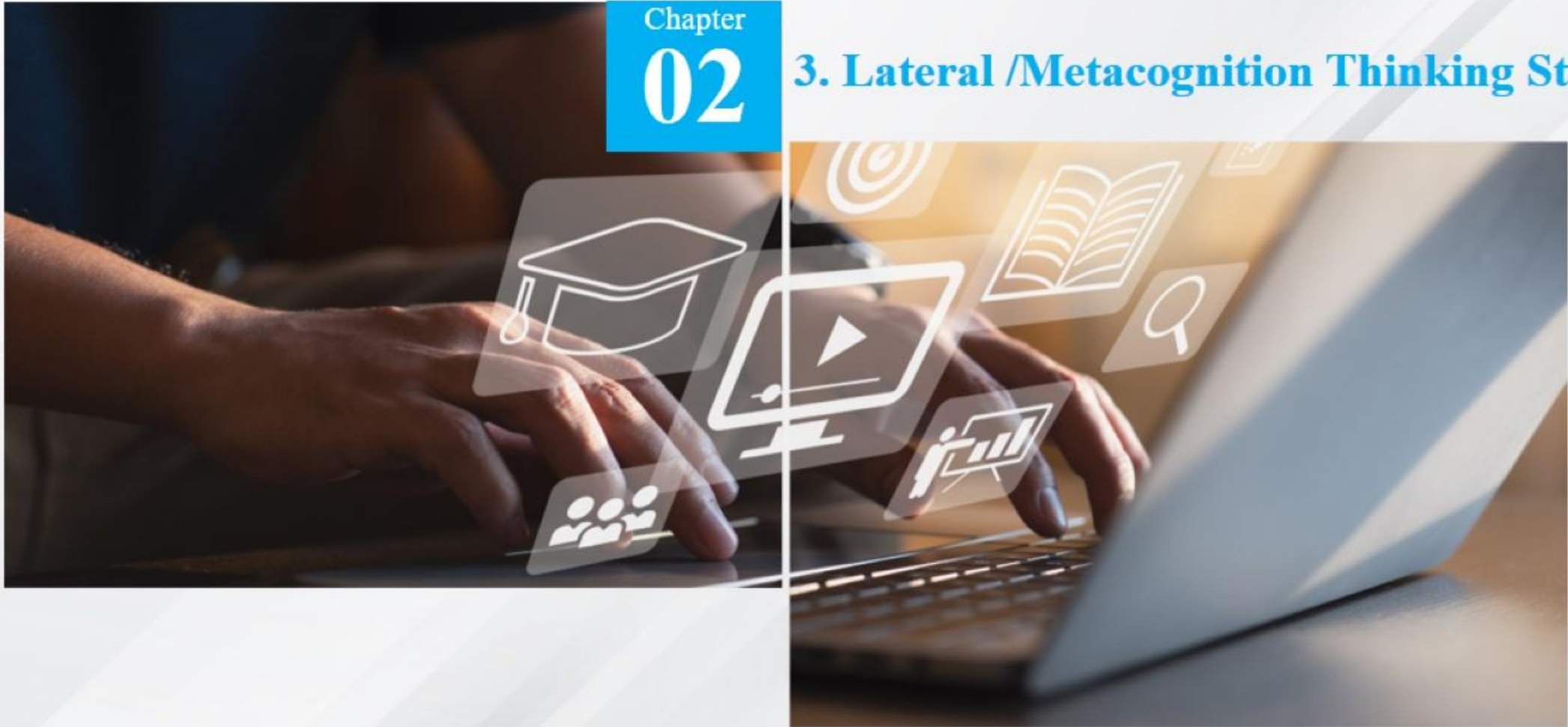
### 2. Creative / Divergent Thinking

1. Generating many possible options
2. Generating a variety of types of possible options
3. Generating originality in possible options
- 4. What if . . . ? How about . . . ? Could we try this or that idea . . . ?***

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### 3. Lateral /Metacognition Thinking Steps:



## 3. Lateral /Metacognition Thinking Steps

### 3. Lateral /Metacognition Thinkingg

1. Monitoring,
2. Evaluating
3. Revising own thinking

# Examples

### Creative/Divergent thinking:

Mr. A's home is at a distance of five miles from work. His Chevrolet gets 30 MPG. However, he wishes to expend less fuel in his travel for both monetary and conservation-associated reasons. Money is not an issue.

## Creative/Divergent thinking:

What choices does he have to cut his fuel consumption?

{it could still be possible to find an option that is entirely different from what the user asked –like devise a vehicle that runs off of air, or start a new business from home.}

### Critical/Convergent thinking:

Mr. A's home is at a distance of five miles from work. His Chevrolet gets 30 MPG. However, he wishes to expend less fuel in his travel for both monetary and conservation-associated reasons. Money is not an issue.

Critical/Convergent thinking:

Which three vehicles are the best replacements for his car?



# Thank You