

Creative and Scientific Thinking

Prepared by Prof. Shereen Taie

CRE252

Information Technology Department

Lecture 2



Creative and Scientific Thinking

Lecture 2

CRE252

Information Technology Department

Prepared by
Prof. Shereen Taie

Learning Objectives:

- Describe the steps in Scientific method
- Examples of the Scientific method steps
- Thinking traps
- Examples of thinking traps
- How to get out of thinking traps
- Practical tips to avoid thinking traps
- What is intelligence
- Types of thinking

Steps of Scientific Method

Chapter

01

Steps of Scientific Method:

The seven steps of the scientific method:

1. Having a **problem** or **question**.
2. **Gathering** information to attempt to answer the question or solve the problem.
3. Propose a solution or answer to the problem or question. Performing a scientific **hypothesis**.

4. Testing the hypothesis by conducting an experiment . If the hypothesis fails the test, it must be rejected or modified.
5. Collect and analyze the results
6. Construct support or cast doubt on a scientific theory.
7. Communicating the results.

Scientific Method:

EXAMPLE

Steps of the Scientific Method

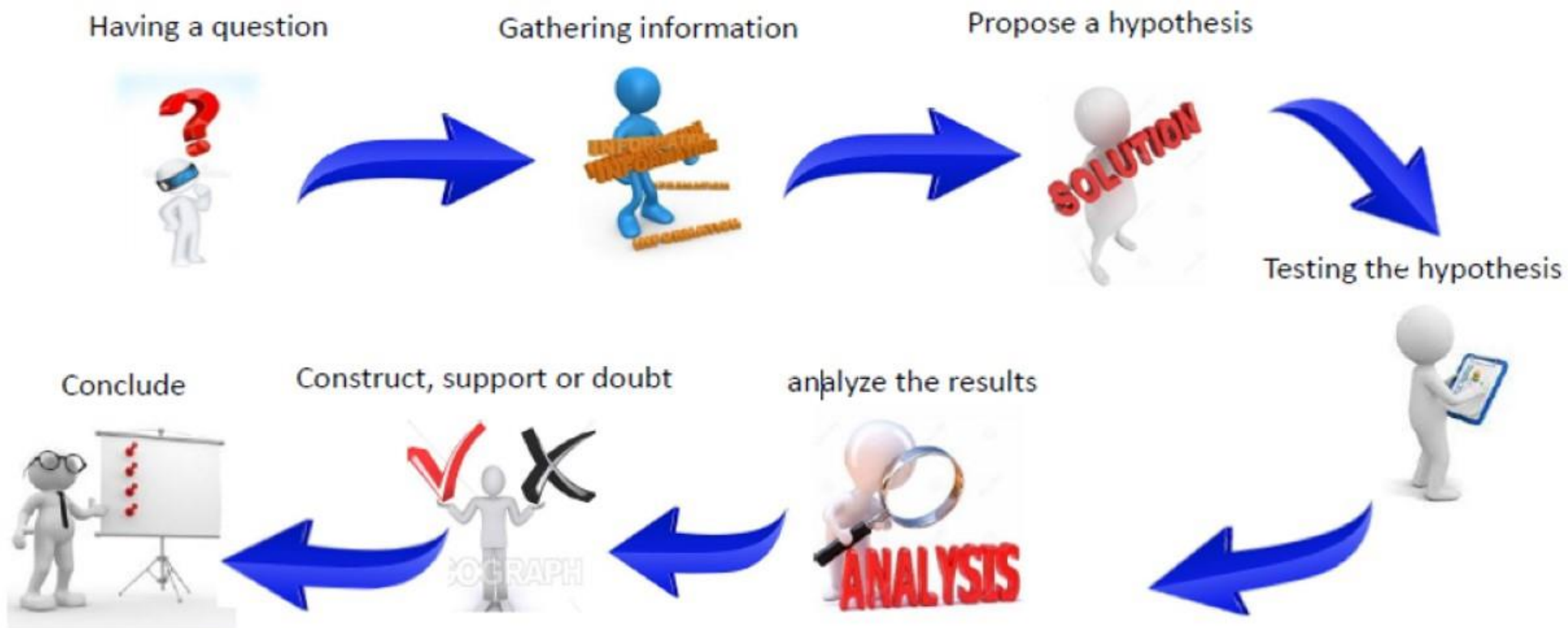
➤ OBSERVE a phenomenon or ASK a question	Does water freeze faster on its own or with sugar added?
➤ Construct a HYPOTHESIS (an educated guess)	I predict that water freezes slower with the addition of sugar.
➤ TEST it via experiment	Place two containers of water, one with sugar added, into the freezer...
➤ ANALYZE the data	
➤ Draw CONCLUSION	
➤ COMMUNICATE findings	

Experiment your way forward, instead of **trying to decide** your way forward

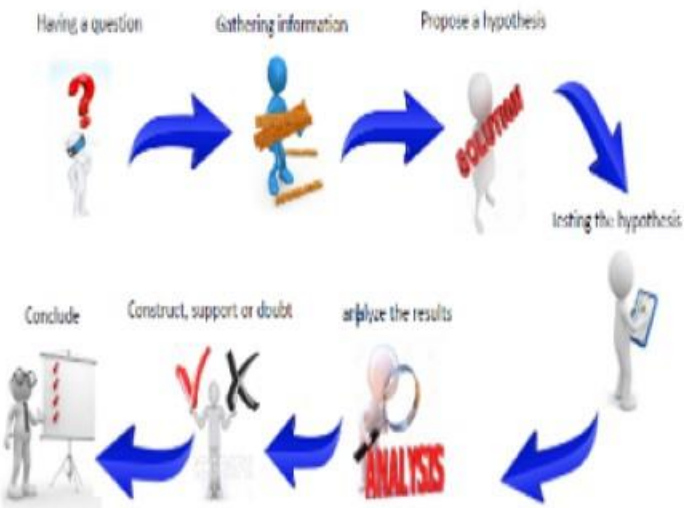


Examples

Scientific Method (Just to remember)



Scientific Method (Just to remember)



1= do mice grow larger if given vitamin C



2=Learn about mice , vit C ,and mice's diet



3= hypothesis (if mice is given Vit C then they will grow larger)



4= experiment on 2 groups (group 1 gets Vit C and group 2 doesn't get)



7=mice don't grow larger if given vitamin C

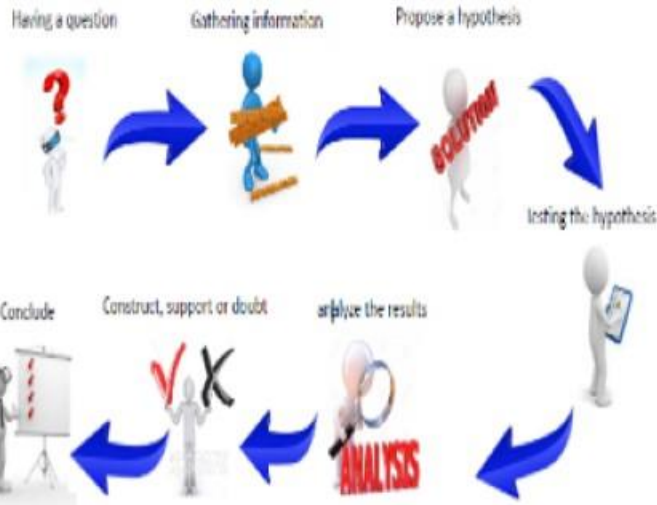


5=collect results. weigh all mice after 2 weeks



6=hypothesis is not correct

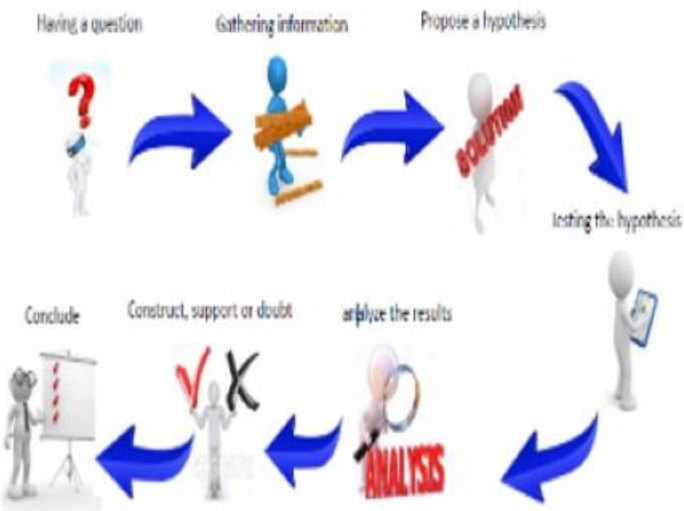
Scientific Method (Just to remember)



Chapter 01

 1= do planting carrots deep in soil, causes them to take longer time to grow than in shallow soil.	 2=Learn about carrots , carrots' planting , deep soil planting and shallow soil planting	 7= planting carrots deep in soil, causes them to take longer time to grow than in shallow soil
 3= hypothesis (If we plant carrots deep in soil, it will take them longer to grow than in shallow soil)	 4= experiment on 2 groups (group 1 plant carrots deep in soil and group 2 carrots planted in shallow soil)	
 5=collect results measure carrots' roots in both groups	 6=hypothesis is correct	

Scientific Method (Just to remember)



 1= How does the size of a dog affect how much food it eats?	 2=Learn about dogs and dogs diet	
 3= hypothesis (If the dog size is big then it will consume more food)	 4= experiment on 2 groups (group 1 small dogs and group 2 large dogs)	
 5=collect results. measure amount of food consumed by both groups	 6=hypothesis is correct	7= the size of a dog affect how much food it eats

Thinking traps

Chapter

01

Thinking traps definition :

- Thinking traps (فخ - مصيدة) are certain types or patterns of thoughts that tend to **trap** us in **anxiety** قلق.
- The first important step to **overcome** Thinking traps is to **recognize** your personal **traps.....then start dealing with it.**

Examples of thinking traps:

- First thinking trap: **Being a perfectionist**
- Second thinking trap: **Self-delusion** خداع الذات





First thinking trap: Being a perfectionist

- If you don't allow yourself to make mistakes ,,, you aren't just putting your self under a lot of pressure **BUT** you won't develop any further either.
- It's unrealistic and unattainable بعيد المنال to be perfect
- If you don't allow yourself to make mistakes; you can **never** develop any further either because, without mistakes, you can't learn.

How to get out of this thinking trap:

- The goal should be to see the **positive in mistakes** and to accept them as well as those of others.
- Mistakes are a learning experience and help you to progress.
- Instead of looking into the past with an
"Oh God, how could I have done that"



How to get out of this thinking trap:

- Think of the future and say to yourself:
"Okay, that went badly but I got an excellent experience
and next time I'll do it better".
- Remember nobody wants to be around someone perfect
all the time.





Second thinking trap: Self-delusion

- Sometimes it's okay to **indulge** تتغمس a little, but it can become problematic when this prevents you from achieving your goals on the long term.
- Indulging and telling yourself things that distract **يصرف الانتباه** you from what matters is obviously an ineffective approach.

How to get out of this thinking trap:

- In general, it's good to question yourself, to be critical, and to ask again and again about what is drawing you back.
- In that way, you can consider what to do about it.



How to get out of this thinking trap:

- It's better to intervene (involve) with yourself as soon as possible.
- Use Useful affirmations such as
"I can stand up for my own goals"



Practical tips to avoid thinking traps

- You can challenge your own thinking traps by finding a "sparring partner" to support you in changing your behavior and to benefit from his experience and knowledge.





- Thinking traps wouldn't be so awful if we were able to **recognize** them and out them immediately .



- Think about a certain situation when you were facing a lot of challenges but you were able to overcome this situation and you were able to **turn your failure into success**—this is called an **anchor** ملاذ .
- **Anchor** is a great technique for those thoughts that resurface when you least expect.

Remember:

1. You don't adopt a new way of thinking overnight simply by flipping a switch.
2. It takes a lot of repetition to get rid of your old thinking patterns.

Chapter 2

Additional Concepts related to Scientific Thinking

Chapter
02

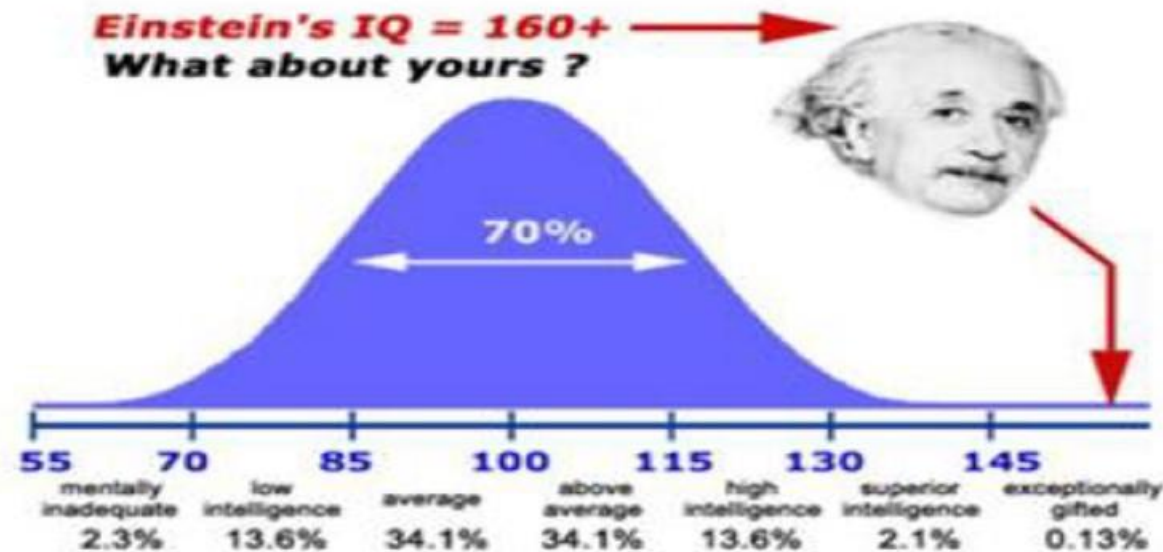
What is Intelligence?



What is Intelligence?

■ Intelligence

- ability to learn from experience, solve problems, and use knowledge to adapt to new situations



Types of thinking :

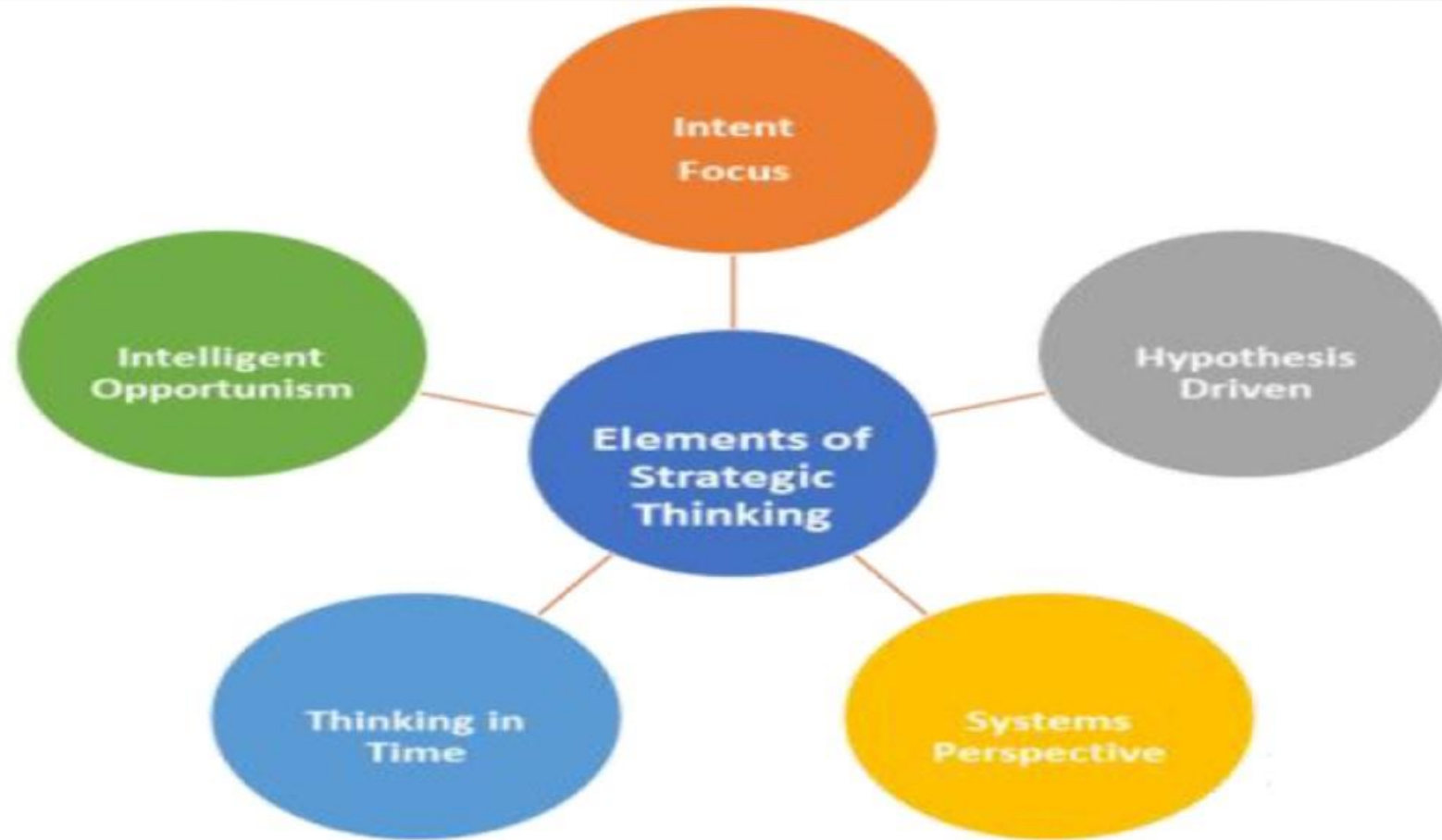
- STRATEGIC THINKING
- SCIENTIFIC THINKING

Strategic Thinking:

- Strategic thinking is simply an planned and rational thought process that focuses on the analysis of critical factors and variables that will influence the long-term success of a business, a team, or an individual.



Five elements of thinking strategically





Five elements of thinking strategically:

1. Intent focused:

The energy to focus attention, to resist distraction, and to concentrate for as long as it takes to achieve a goal.

2. A systems perspective:

It is knowledge about the organization.



Five elements of thinking strategically:

3. Thinking in Time:

Connecting the past to the present to the future. You learn from the past and use that learning to make predictions.

4. Intelligent Opportunism:

Search for new Ideas and knowledge.

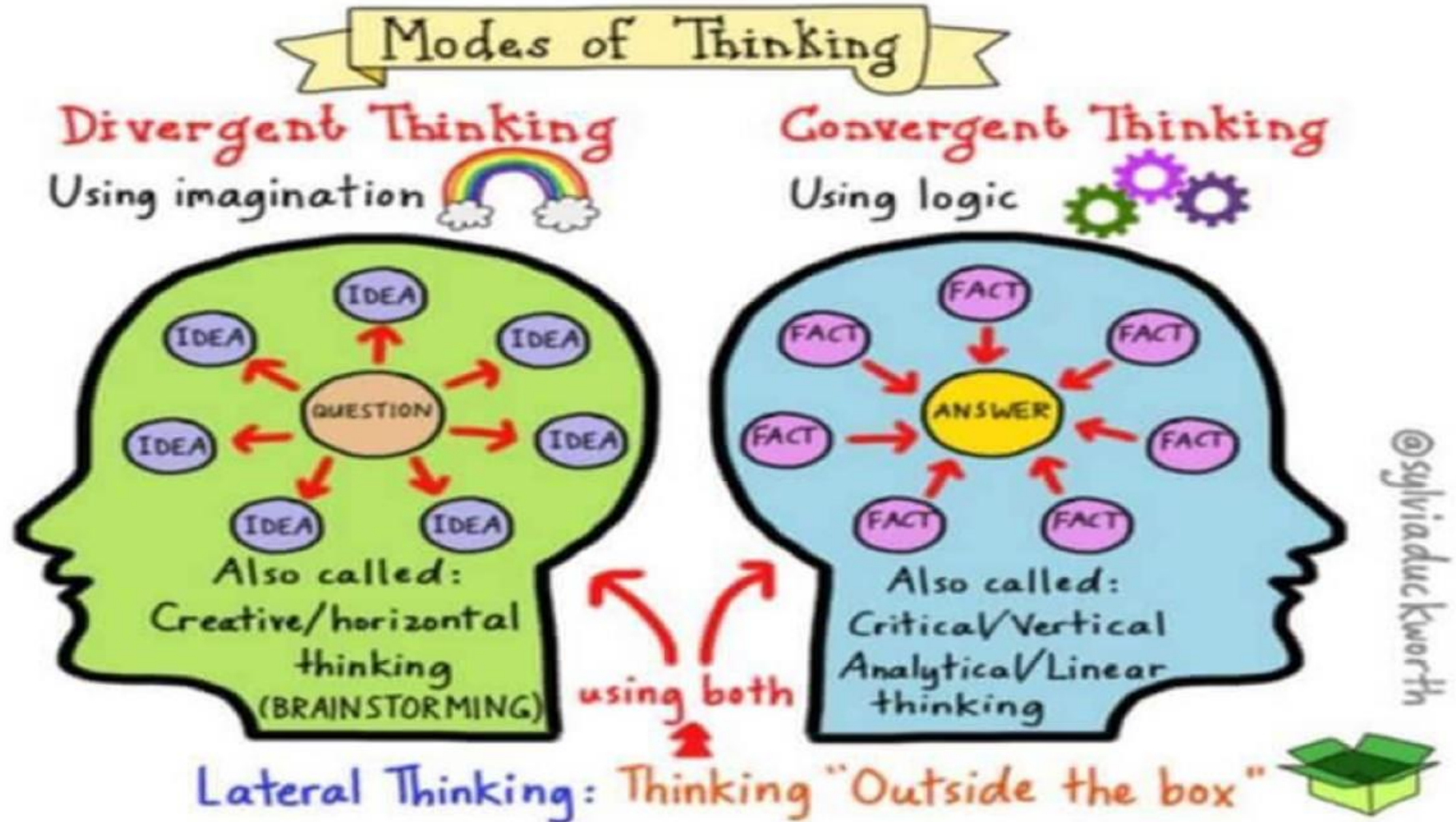
5. Hypothesis driven:

Create new hypothesis for future actions.

Scientific Thinking:

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

Three types of Scientific thinking



Scientific Thinking:

1. Creative/Divergent Thinking :

- **Using:** Imagination
- **Called:** Creative/horizontal thinking
- **Example:** Brain Storming

Scientific Thinking:

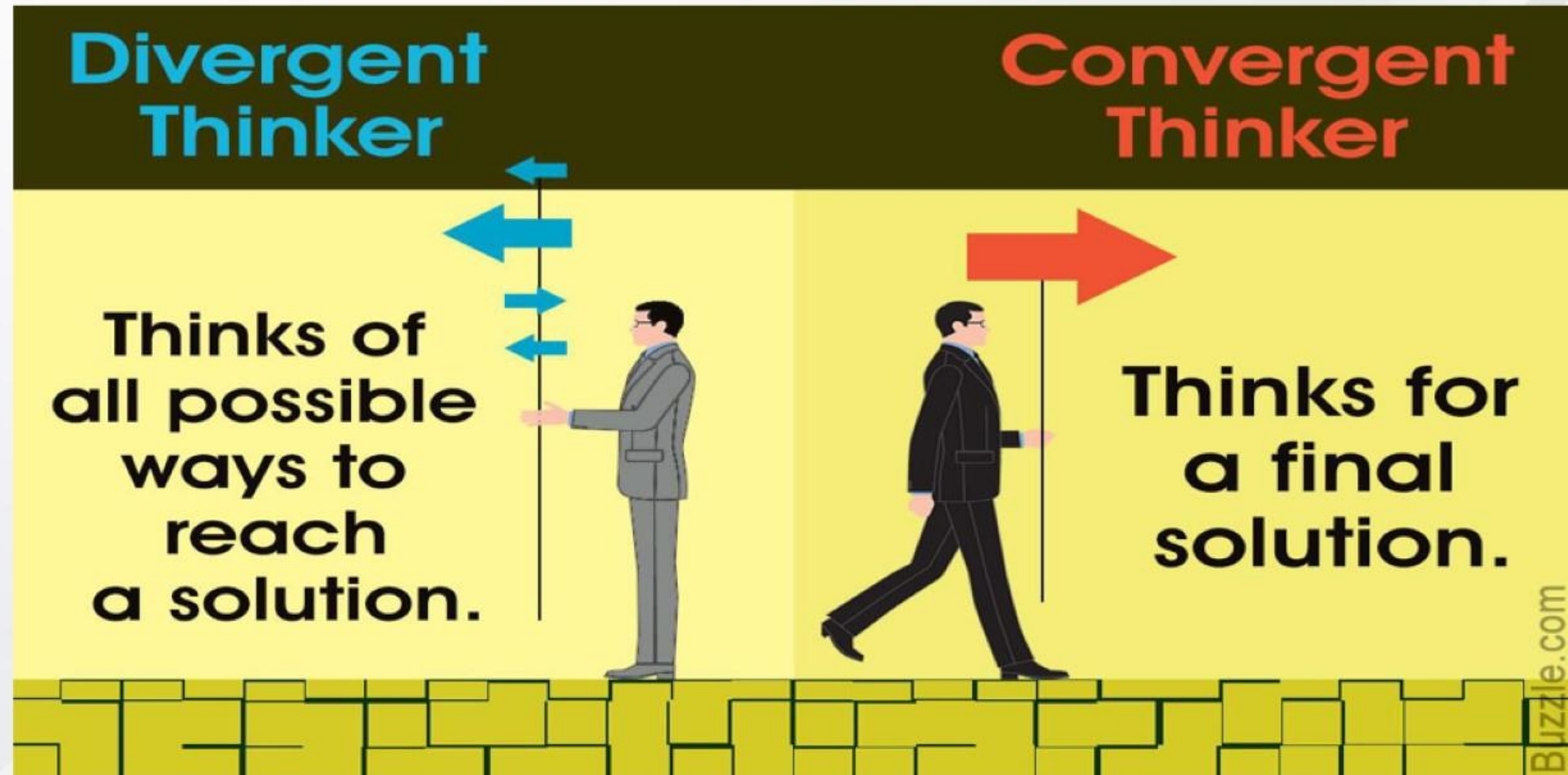
2. Critical/Convergent Thinking:

- **Using:** Logic
- **Called:** Critical/Vertical thinking
- **Called:** Analytical/Linear thinking

Scientific Thinking:

3. Lateral /Metacognitive (thinking about their thinking) thinking individual.

- **Thinking : Outside the box”**
- **Using:** both,
- **Creative/Divergent Thinking** and
- **Critical/Convergent Thinking.**





Thank You